THE FOUNDRY for November

Gives Real STIMULANT

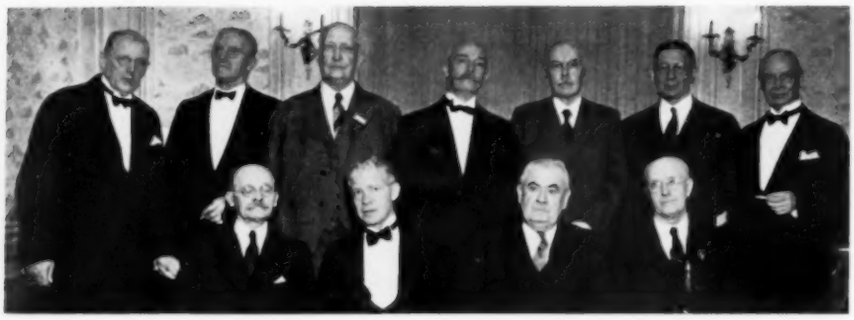
TIMED right and exceedingly well staged, the Philadelphia convention and exhibition of the American Foundrymen's association proved a stimulant and a real inspiration to a depression wearied industry. Far exceeding in attendance and interest, the early estimates of those charged with the responsibility of presenting the convention, the effect will be tonic to the entire foundry industry. No previous gathering of the association can possibly have been of greater general benefit. Scattered reports from foundrymen indicated an improved business outlook in castings manufacture. The large number of foundry executives participating in the meetings and discussions indicated a revival of determination to advance and move forward in technical progress. The type and variety of new equipment and supplies, as outlined in the October and November issues of THE FOUNDRY, testify to the great strides made in the past four years. Interest in these new facilities now are more than ever necessary to foundry progress, and the actual purchases made prove the vision, faith and determination of the foundry industry.

Gifts of the GREEKS

THOSE smaller industries, which in the first flush of trusting faith, accepted the promised partnership of NRA and wrote into their codes provisions forbidding selling below costs, are dismayed. Believing in the intent as well as the words of those early in posts of administrative authority, most of them hoped that their individual industries would be given some control over the destructive practices of the ignorant or predatory price cutter. Many, small and lean from the depression years, despairing of immediate ability to formulate and enforce standard cost procedure listened to the fair words of NRA and applied for permission to use standard formulas, to fill the gap and to make the code cost provision function. To these trusting souls has NRA given, of its wisdom, certain precepts and *verbotens* typical of academic ignorance. The recommendations provide for including raw material and labor costs at actual or current basis, *whichever is lower*. No research development, advertising or promotion expense may be added. Depreciation, insurance, and idle maintenance expenses must be forgotten. Interest, of course, is anathema and must be omitted. And the same is true of reserve for contigencies; while a firm fortunate enough to operate at greater than normal rate may employ such basis of operation for predetermined overhead rates. Finally, if an industry has a prescribed, recognized cost system, any member may disregard this and have the right to use "more adequate methods." If adopted, these NRA provisions would offer no assistance to reputable manufacturers since the chiseler could continue to evade, abuse and wreck the industry cursed by his competition, without let or hinderance from the code regulation.

And This is AMERICA

THE FOUNDRY previously has warned of the need for training men for the industry. Mention also has been made of the steps to tie in apprentice training with NRA under the executive order of July 15, 1934. This work is now going forward with the usual celerity which marks the Washington support of those phases of social reform with which certain dominant personalities are infatuated. More is forthcoming concerning the plans for supplying the young idea with ample spoon fed provender relating to collective bargaining, government ownership, and the beauties and merits of the alphabetical lineup of the new deal. Some have suggested, that with the NRA apprentice plan functioning, it might not be far from the thoughts of the committee working under the secretary of labor to regiment still further. Mandatory assignment of certain numbers of apprentices, with the attendant regulation of hours, wages, etc., might lift some of the load of CCC from tired Washington shoulders.



Eleven charter members of the A.F.A. were guests of honor at the alumni dinner Monday night

Convention Shows Industry Gaining

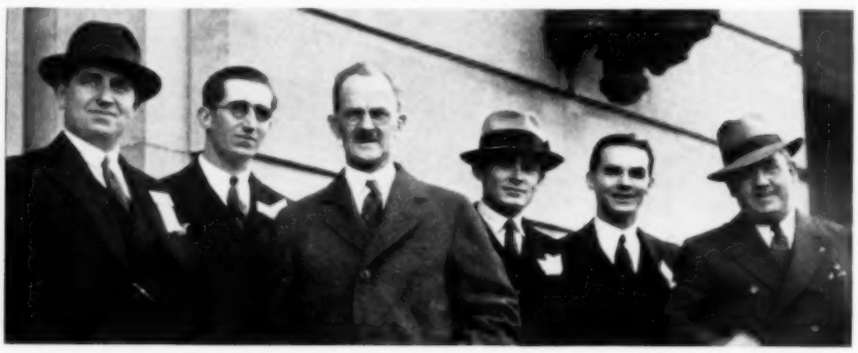
Splendid attendance and interest in program point to new era for castings

ENTHUSIASM displayed by the 4000 foundrymen who attended the Fifth International Foundry Congress and the 38th annual convention and exposition of the American Foundrymen's association in Philadelphia, Oct. 22-26 undoubtedly marks a new forward movement in the history of the foundry industry. After four years of business adversity, during which time, however, the industry has made more progress in metallurgical developments, practice procedure and field of application of castings than in any similar period in the history of founding, leaders in the industry evidenced their belief that the turn has come. The inquiring convention visitor could not help but gain that impression in conversations with many of those present.

Foundry week itself was a decided success from every standpoint. The registration list includes leading foundrymen — plant managers, metallurgists, superintendents and foremen — from every section of the United States, with the East and South taking honors in representation, as would be expected. Technical sessions were exceptionally well attended, and in the main the papers and discussions added much to the sum total of knowledge of the industry. As has been the case every year since their introduction, the shop courses — this year devoted to sand control and gray iron foundry practice attracted a good attendance and stamped that feature one of the most valuable of the entire technical program.

The international aspect of this convention provided an exceptional opportunity for interchange of information of foundry progress with recognized leaders of Europe. An extraordinarily large number of exchange papers brought to American foundrymen not only extensive data on latest developments in numerous lines of practice and theory, but carried messages of good will from abroad to castings manufacturers of this country. The presence of the large delegation of European foundrymen in the United States prior to and during the convention could not help but be an inspiration to the many foundrymen with whom the overseas visitors came in contact.

A tour of leading eastern foundry centers in which about sixty of the overseas guests participated, gave to them a brief glimpse of

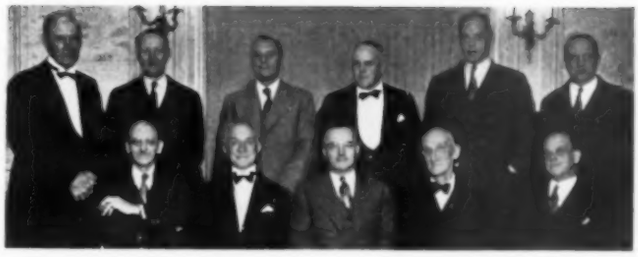


The mayor of Philadelphia and a group of European and American foundrymen. The mayor welcomed the convention visitors at the opening session

American manufacturing processes. Further, through the hospitality of foundry groups in Buffalo, Niagara Falls, Chicago, Milwaukee, Detroit, Saginaw, Cleveland and Pittsburgh, many acquaintances were made on the preconvention tour which were renewed during the week in Philadelphia.

At the formal opening of the fifth international foundry congress J. H. Moore, mayor of Philadelphia extended greetings to members of the American Foundrymens association and to the visiting foundrymen from over seas. He referred in patriotic terms to the prominent part taken by Philadelphians in the early history of the country and in subsequent local and national affairs. The influence exerted by one of the greatest Americans, Benjamin Franklin, still permeates the atmosphere of a country whose real history only commenced with the signing of the Declaration of Independence.

Touching on the iron industry he referred to the fact that this is one of the most ancient of all industries and one of the most important.



Past presidents of the American Foundrymen's association who attended the alumni dinner. Seated, left to right: R. A. Bull, G. H. Clamer, Fred Erb, B. D. Fuller, E. H. Ballard. Standing, left to right: W. H. McFadden, L. L. Anthes, L. W. Olson, S. W. Utley, T. S. Hammond, W. R. Bean

The founder's art is the base of and essential to all forms of modern progress. He paid graceful tribute to the work of former prominent Philadelphia foundrymen who passed from the scene during the past year. In conclusion he read a letter of regret from Secretary of Commerce Daniel C. Roper who unavoidably was prevented from delivering a welcome in person.

Frank J. Lanahan, president of the American Foundrymens association asked Tom Makemson, secretary, Institute of British Foundrymen, to introduce the foreign delegates. Responses to the various introductions were presented by J. Leonard for Belgium; A. Brizon for France; E. Piwowarsky for Germany; J. Smith for Great Britain; Dr. Ing. Luigi Norsa for Italy; W. Watha Kosiski for Poland and Prof. Jose Navarro Alcacer for Spain. Several of these men responded in English. The other addresses were translated by V. Delport, European manager of THE FOUNDRY. Greetings from the British and French foundry associations were read by Dan M. Avey, chairman of the international relations committee of the A. F. A.

On Monday evening of convention week, John A. Penton, chairman of the board, the Penton Publishing Co., Cleveland, was singularly honored by the board of directors of the American Foundrymen's association for his conspicuous service to the foundry industry during the founding of the association in 1896, and for the inspiration he gave that organization in the five years following when he served as secretary.

A record of enduring esteem and appreciation of the association is contained in an engrossed resolution of the board of directors which was presented to Mr. Penton at the annual alumni dinner of past and present officers and charter members of the association. The presentation of the engrossed resolution and a beautiful cast bronze Pegasus was made by S. Wells Utley, Detroit Steel Casting Co., Detroit, and a past president of the association.

The annual dinner was honored and inspired greatly by the presence of 11 of the charter members of the association. That group, which is shown in the illustration at the top of page 18 of this issue, includes the following men:

Association's First Secretary Honored by Directors

THE following resolution of the board of directors of the American Foundrymen's association, suitably engrossed, was presented to John A. Penton, chairman of the board, Penton Publishing Co., at the annual alumni dinner on Monday evening of convention week:

To John A. Penton
Friend and Counsellor of Foundrymen

Two score and two years ago you brought to the inarticulate American foundry industry a vision of national unity. As founder, editor and publisher of THE FOUNDRY you emphasized the bond of common interest existing among foundrymen and inspired them to consider the advantages of co-operating for their mutual benefit. Through printed page and by virtue of your contacts with thousands of acquaintances in every community where castings were poured you contributed more than any other individual to the creation of an inspired industry consciousness.

Later when this newly born spirit culminated in plans for the first national meeting of foundrymen in Philadelphia, you voluntarily, unofficially and at your own expense, stimulated widespread interest in the event, insuring the representative attendance which made possible the founding of the American Foundrymen's association. During the first year of its existence, as secretary you nursed the organization through its most critical period, serving virtually as executive officer and board of directors.

For this conspicuous service to the industry, for your unwavering interest and support to the American Foundrymen's association from the date of its founding, and for the inspiration you have given to thousands of foundrymen everywhere, the American Foundrymen's association by the unanimous action of its board of directors, desires to record its enduring esteem and appreciation.

Frank J. Lanahan, President
C. E. Hoyt, Secretary

E. J. Lame, R. D. Wood & Co., Philadelphia; W. P. Barba, Philadelphia; John A. Penton, Penton Publishing Co., Cleveland; Leonard Peckitt, New York; H. R. Valentine, Woodbridge, New Jersey; George T. Johnson, Philadelphia; George F. Pettinos, Philadelphia; William J. Coane, the Ajax Metal Co., Philadelphia; Jesse M. Darke, engineer of materials, General Electric Co., River Works, West Lynn, Mass.; James S. Stirling, Wilmington, Delaware; John Hill, the Hill & Griffith Co., Cincinnati; George C. Davies, Philadelphia.

Tuesday evening the A. F. A., assisted by Philadelphia foundrymen, held a reception and entertainment at Franklin institute for the overseas guests, which was unusual and provided a most interesting evening for the several hundred present. Following the reception in the large rotunda of the institute building, which incidentally in the future will house a beautiful cast statue of Benjamin Franklin, the guests were taken to a special demonstration theater where certain steps in the development of motion pictures were explained and the progress in sound and colored pictures demonstrated. The testing laboratory was visited and the program was closed with a special lecture in the planetarium.

The especially interesting program at the annual banquet on Wednesday night attracted a good attendance. Overseas guests were welcomed by President Lanahan and the heads of the various delegations were introduced by Vice President Avey. The response by J. Leonard, of Belgium carried with it a message of good will and co-operative understanding from the foundry associations of Europe.

The speaker of the evening, A. W. Robertson, chairman of the board, Westinghouse Electric & Mfg. Co., Pittsburgh, discussed the effect of metals on our civilization, from the political, social and ethical standpoints.

Formal presentation of the J. H. Whiting gold medal of the association to Arnold Lenz,

An interesting selection of photographs of various members of the European delegation

Chevrolet Motor Car Co., Flint, Mich., for his contributions to the progress of the foundry industry, was made by Gen. T. S. Hammond, Whiting Corp., and a past president of the association. Mr. Lenz responded briefly.

One of the high lights of the entire week was the special lecture on foundry progress, which was presented by Mr. Lenz just preceding the annual meeting of the association on Thursday afternoon. The paper will be presented in an early issue of THE FOUNDRY.

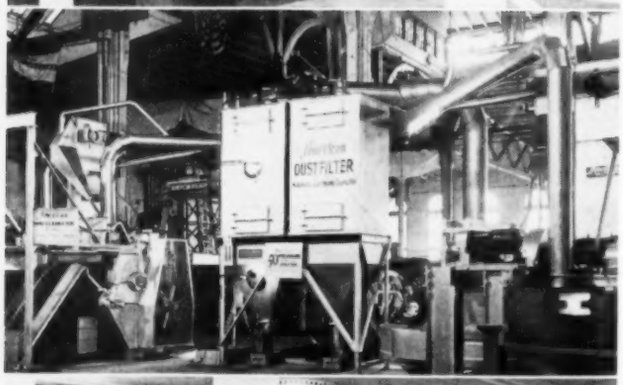
Chairman and retiring president, Frank J. Lanahan, in opening the thirty-eighth annual business meeting of the association first called upon Executive Secretary C. E. Hoyt to read the report of the nominating committee. The committee had met June 28 with N. K. B. Patch, Lumen Bearing Co., Buffalo, as chairman. Choices for association officers for the ensuing year and for directors to serve 3 years were read as follows:

President, Dan M. Avey, Editor, THE FOUNDRY, Cleveland; vice president, B. H. Johnson, assistant to the president, R. D. Wood & Co., Philadelphia; directors, E. O. Beardsley, president, Beardsley & Piper Co., Chicago; Edward W. Campion, general manager, Bonney-Floyd Co., Columbus, O.; Albert E. Harrison, general superintendent of foundries and pattern shops, Allis-Chalmers Mfg. Co., Milwaukee; Frank J. Lanahan, president, Fort Pitt Malleable Iron Co., Pittsburgh; and Sam Tour, vice president, Lucius Pitkin, Inc., New York.

These selections were approved and declared elected. They will assume office at the next meting of the board of directors, to be held within 90 days following the close of the convention. Messrs. Avey and Johnson made brief speeches of acceptance.

H. B. Hanley, American Laundry Machinery Co., Rochester, N. Y., read the selections for the 1935 nominating committee, which will include three past presidents and George Cannon, Campbell, Wyant & (*Please turn to page* 47)

taken in the several important foundry centers visited on the preconvention tour



Exhibition Reveals Great Progress In Equipment And Supplies

PROGRESS made by manufacturers of foundry equipment and supplies during the past 4 years was illustrated remarkably at the large exposition held in Philadelphia Oct. 22-26 in conjunction with the Fifth International Foundry congress and annual convention of the American Foundrymen's association. Undoubtedly a greater percentage of exhibitors showed new or improved products than at any previous show, thus illustrating the point brought out in the article "Equipment Furthers Foundry Progress" in the October issue of THE FOUNDRY, that remarkable developments in products and equipment during the past 4 years have established the foundry industry in the strongest position in its history.

With the attendance closely approximating 4000, convention visitors and especially those who have attended these annual meetings for a number of years, were impressed greatly with the exceptional interest displayed by foundrymen from all sections of the country. Two large halls housing the exhibits were the Mecca of several thousand foundrymen who found the 1934 show a passing review of improvements, with each exhibit a source of much valuable information. Reports from various exhibitors indicate that a substantial amount of equipment was sold at the show. Convention visitors and exhibitors alike praised the combined convention and exhibition as an outstanding success, and predicted that the unusual interest manifested is a harbinger of marked improvement in business, both for the foundry industry and the foundry equipment and supply fields.

A most successful feature of the exhibition and one which was attended by over 2000 was the mystery night program, when the show was kept open until 10 p.m. Plans for that celebration were made by a committee of the A.F.A. consisting of the following: Chairman, John D. Wise, Foundry Equipment Manufacturers association, Cleveland; L. P. Robinson, Werner G. Smith Co., Cleveland; W. J. Muhlitner, Great Lakes Foundry Sand Co., Detroit; Lester B. Knight, Jr., National Engineering Co., Chicago; and J. M. Lathrop, Penton Publishing Co., Cleveland. Winners of prizes at drawings in each exhibition hall are shown in the box on the opposite page.

Newer developments in equipment for cleaning castings by blasting provided one of the most interesting features of the show. W. W. Sly Mfg. Co., Cleveland, operated its new revolving barrel type blasting unit in which the blast is supplied by a blower driven by a 10 horsepower motor. The one piece revolving barrel is 46 inches in diameter and the abrasive material is returned to the feed hopper automatically

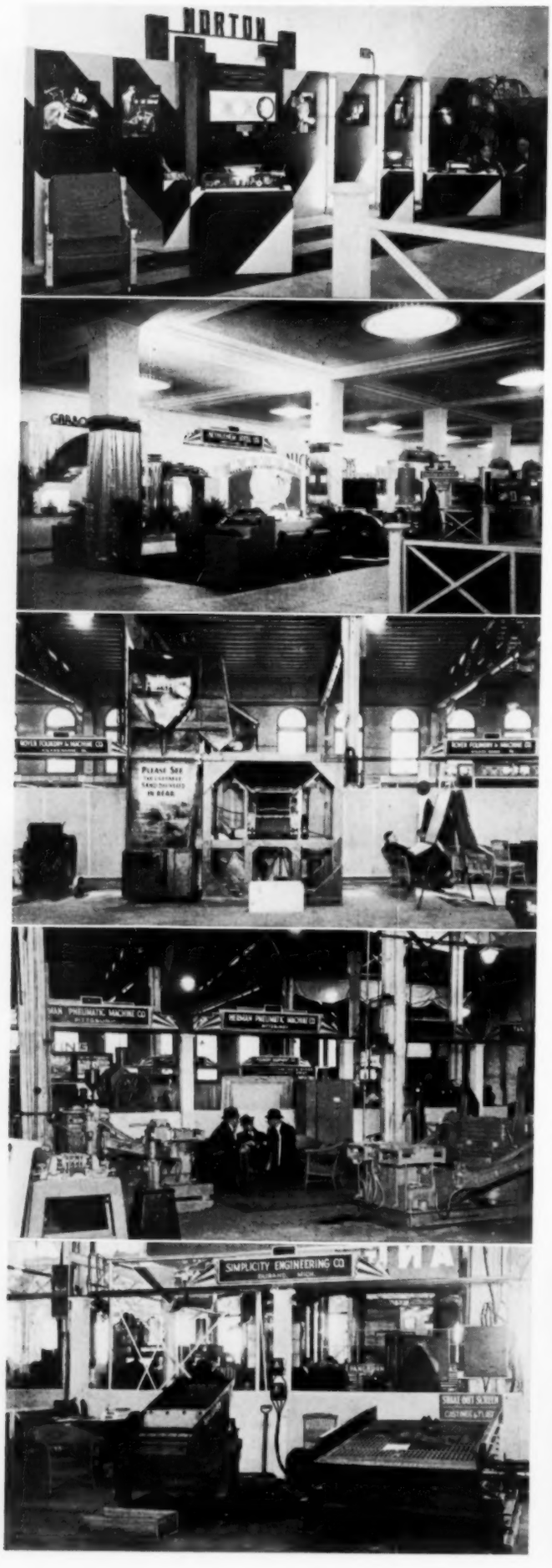
through an arrangement between the inner and outer shell. The barrel in operation runs 5 minutes at 12 revolutions per minute and then is operated at 6 revolutions per minute with the blast on. It shuts off automatically when the cleaning cycle has been completed.

Pangborn Corp., Hagerstown, Md., displayed for the first time its centrifugal blast cleaning machine, which has an 18 cubic foot capacity and features low head room and a low loading point. The interior of the unit has two revolving drums and a stationary strip in the center. The action of the revolving drums throws the castings into the center strip directly under the abrasive stream created by a revolving wheel. That company also showed a flat tube type dust col-

Prize Winners at the Mystery Night Celebration

OVER 2000 convention visitors found much of interest at the exhibition on Thursday night, when a special mystery night program was presented under the auspices of a committee of the A. F. A. Prizes were won by the following:

D. W. Brinson, foundry superintendent, Norfolk Navy Yard, Portsmouth, Va.	$100.00
Charles Reymon, foreman, Atlantic Foundry Co., Akron, O.	$100.00
A. Reyburn, foreman, Canadian National Railways, Montreal, Canada	$20.00
J. E. Dwege, quartermaster molder, Navy Yard, Philadelphia	$20.00
E. R. Cornell, works engineer, Link-Belt, Co., Philadelphia	$10.00
R. L. Binney, vice president, The Binney Castings Co., Toledo, O.	$10.00
B. A. Nuller, Baldwin Locomotive Works, Philadelphia	$10.00
C. A. Shepherd, foundry superintendent, Hobart Mfg. Co., Troy, O.	$10.00
Anton Johnson, foundry superintendent, J. S. White Co., Pawtucket, R. I.	$5.00
Michael Cullen, salesman, Scullin Foundry, Philadelphia	$5.00
E. J. Hedlund, works manager, Erie Malleable Iron Co., Erie, Pa.	$5.00
Leon B. Thomas, assistant technical superintendent, Ohio Brass Co., Mansfield, O.	$5.00
William Galt, foundry foreman, Olney Foundry Co., Philadelphia	$5.00
John Walker, plant engineer, Berkley Machine Works, Norfolk, Va.	$5.00
Walter Yost, foundry superintendent, Reading Iron Co., Philadelphia	$5.00
A. W. Schuller, vice president, Reliance Bronze & Aluminum Foundry Co., Philadelphia	$5.00
J. F. Muller, molder, Progressive Foundry Co., Rochester, N. Y.	$5.00
John Grennan, instructor, University of Michigan, Ann Arbor, Mich.	$5.00
Andrew L. King, foundry foreman, Morse Chain Co., Ithaca, N. Y.	$2.00
H. E. Mulligan, superintendent, Charlotte Pipe & Foundry Co., Charlotte, N. C.	$2.00
E. Lindsley, master mechanic, Dodge Steel Co., Philadelphia	$2.00
Harvey Scheid, foundry foreman, North Wales Machine Co., North Wales, Pa.	$2.00
A. Shaw, foundry superintendent, Olney Foundry Co., Philadelphia	$2.00
William Litner, foundry superintendent, Spring City Foundry Co., Spring City, Pa.	$2.00
M. J. Leffler, foundry superintendent, Oliver Farm Equipment Co., South Bend, Ind.	$2.00
D. A. Pope, patternmaker, Grimm Foundry Co., Bound Brook, N. J.	$2.00
J. L. Paxton Jr., vice president, Paxton-Mitchell Co., Omaha, Nebr.	$2.00
Eber O. Reese, foundry helper, Reese Padlock Co., Lancaster, Pa.	$2.00



lector, a new blasting room complete with elevators and separators, a new separating unit to remove nails and wire, a cabinet type blasting unit and a small sandblast barrel.

American Foundry Equipment Co., Mishawaka, Ind., provided a striking display of its wheelabrator, an airless abrasive cleaning device in which the abrasive material is handled and thrown against the work mechanically by a revolving wheel. The company also showed that design of cleaning unit installed in a continuous tumbling type blasting machine and in a rotary table type blasting unit, as well as continuous dust filter in which a portion of the equipment may be reversed for cleaning while the remainder of the unit cleans the air, and a sand cutting machine. Parsons Engineering Corp., Cleveland showed a number of its oval and flat bags for its line of dust arresting equipment.

C. O. Bartlett & Snow Co., Cleveland, displayed for the first time a newly developed machine for extracting dust from the air which passes through it. The dust laden air is passed through a water bath to which a small amount of oil is added to form a frothing filter carpet. The company also displayed a model of its mold conveyor.

Showed Many Types of Abrasives

Pittsburgh Crushed Steel Co., Pittsburgh, Steel Shot & Grit Co., Amesbury, Mass., and the Globe Steel Abrasive Co., Mansfield, O., maintained a combined booth and showed samples of various sizes and grades of steel shot and grit, as well as castings cleaned with metallic abrasives. Steelblast Abrasives Co., Cleveland, exhibited its line of steel shot and grit in various grades and sizes.

An especially attractive display was presented by the Carborundum Co., Niagara Falls, N. Y. The booth had a large revolving wheel in the background which was covered with carborundum, and in front of this a miniature of Niagara Falls pictured the night lighting effects of that scene. The company displayed crude carbide of silicon, a wide variety of wheels, core files, metal cloth, small abrasive shapes for die work, and polishing grain.

Norton Co., Worcester, Mass., had several

wheels placed behind a large magnifying glass to show the grain structure. The company also showed its new metal, a boron carbide known as norbide, in the form of blasting nozzles and other shapes, its diamond wheel, sharpening specialties and refractory shapes. The artistic background of this booth carried a number of illuminated photographs showing various grinding operations.

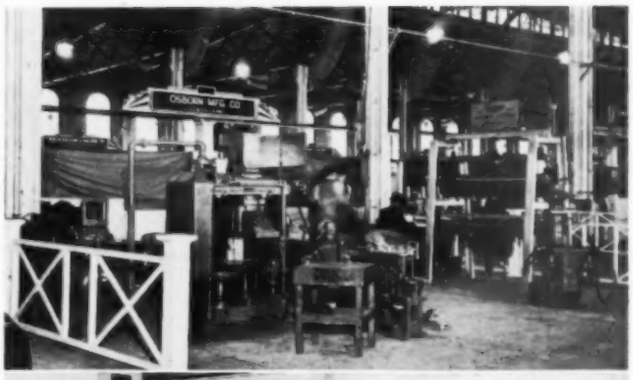
A new swing frame grinder direct connected to the motor was operated by the Sterling Grinding Wheel Co., Tiffin, O. That company also showed wheels for snagging castings, a variety of other types of grinding wheels, and high speed cut off wheels. The wheel on the swing frame grinder travels at 9000 surface feet per minute.

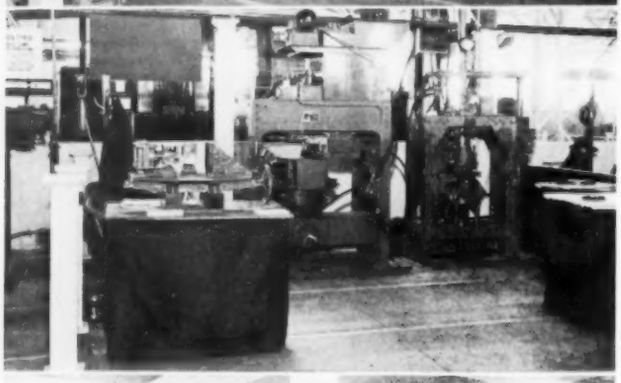
Makers Show Coke and Charcoal Iron

An exceptionally large number of companies exhibited pig iron. Bethlehem Steel Co., Bethlehem, Pa., showed samples of standard and silvery mayari pig iron and a number of castings in which that type of iron was used. Superior Charcoal Iron Co., Grand Rapids, Mich., exhibited samples of charcoal iron showing the structure of the various grades made by that company. The company also showed samples of the various raw materials used in the manufacture of that iron.

Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., displayed samples of its iron, sections showing the structure and polished surface, and numerous types of castings produced from its iron. Chateaugay Ore & Iron Co., New York, attracted attention with a flexing test of coil and strip cut from pig iron. Samples of iron and castings also were shown. Samples of coke, pig iron, solid rock sand and a model of a coke oven were exhibited by the Debevoise-Anderson Co., Inc., New York.

Molding machines in wide variety were shown by many manufacturers. Arcade Mfg. Co., Freeport, Ill., showed several models including a large hand squeeze machine with several improved features including a swing out table to facilitate removal of the finished mold. Beardsley & Piper Co., Chicago displayed a new model sand slinging machine which has the device sus-





pended from a horizontal support through a universal joint. Motor and paddle are located close to the support and sand is conducted vertically through an 8-inch pipe to a point above the flask or corebox. That company also displayed two models of shaking screens.

Herman Pneumatic Machine Co., Pittsburgh, showed two heavy duty rollover molding machines equipped with runout tables and with timing devices which regulate automatically the number of jolts for any given mold. Osborn Mfg. Co., Cleveland showed several types of molding machines, including one equipped with special valve device which regulates the number of jolts. That company also operated a small compressor to supply air for operating the various units on display including the latest model of a core blowing machine. That machine is made in three sizes, capable of blowing cores approximately 24, 36 and 50 pounds in weight. Sequence of operation is entirely automatic to prevent the possibility of error or danger to the operator. A special auxiliary device removes the core accurately from the corebox.

Two core blowing machines were displayed by Wm. Demmler & Bro., Kewanee, Ill. One machine, developed especially for application in the automotive field, is provided with a double blowing head for use on long cores. An agitator in the tank above the machine provides an even flow of sand.

Many Manufacturers Represented

Johnston & Jennings Co., Cleveland displayed several molding machines including a portable, jolt-squeeze straddle type, and a rollover jolt machine equipped with three cylinders and special clamping device. Wm. H. Nicholls Co., Richmond Hill, Long Island, N. Y., showed several heavy duty molding machines also a sand mixing machine provided with grooved mullers. Tabor Mfg. Co., Philadelphia showed several types of new molding machines including a rapid action jolt squeeze, self clamp, rollover, pattern draw with a 16-inch diameter cylinder.

Several types of tractors equipped with pneumatic tires were shown by the Clark Tructractor Co., Battle Creek, Mich. Harnischfeger Corp., Milwaukee, exhibited crawling traction cranes, monorail tramrails, welding and cutting equipment. Link-Belt Co., Chicago, showed a wide variety of conveyors, monorail and tramrail equipment, speed reducers and transmission equipment. Chicago Mfg. & Distributing Co., displayed buggy ladles equipped with lids and mounted on pneumatic tires, as well as bag holder trucks and flasks.

Growing recognition of the importance of prepared sand was reflected in the comparatively wide display of sand preparation equipment.

National Engineering Co., Chicago, showed a muller type machine equipped with improved gears and ball bearings. The efficacy of the machine has been increased by mounting the rollers in stagger position in regard to a diametrical line. The rollers may be adjusted to any given clearance above the bottom. A revolving drum with projections catch the sand as it is discharged and delivers it in an aerated condition.

In a mixing machine exhibit by the Lancaster Iron Works, Lancaster, Pa., the pan revolves in one direction while the rollers revolve in the opposite direction. Rollers are mounted at off center and plows throw sand under the rollers. When the batch of sand is mixed the circular plate in the center of the bottom is dropped and moved to one side and the sand falls through the opening.

Removes Dust from Sand Mixer

Improvements to the revolving screen exhibited by the Standard Sand & Machine Co., Chicago, include a removable dust collection hood which encloses the screen. An exhaust system attached to the upper part of the chamber removes all the dust generated during the mixing process. A long cleanout door has been placed along one side and a scraper follows the paddles to prevent any sand from adhering to the trough.

Royer Foundry & Machine Co., Kingston, Pa., had a combination device to illustrate one application of the aerator and mixing machine. In this the sand is lifted by an elevator and discharged over a vibrating screen. All foreign material is caught by the screen inclined at an angle whereby the scrap, gaggers, etc. are directed into any suitable receptacle. The sand falls through the screen into the hopper of the aerator which throws it in prepared condition into any desired location. The company also displayed its portable sand aerating and blending machine.

In the muller type mixer displayed by the Clearfield Machine Co., Clearfield, Pa., the pan revolves while the rollers remain in a stationary position. A third, thin roller mounted at right angles to the two mixing rollers remains in a lifted position during the mixing process. When the sand is ready, this roller is lowered and it throws the prepared sand clear of the pan.

In a portable aerator type of machine made by the Jeffrey Mfg. Co., Columbus, O., the frame is a one piece steel casting. Sand may be shoveled or dropped from a grab bucket on a horizontal screen which removes the refuse. The sand falls through the screen onto a rapidly revolving paddle wheel which aerates and discharges it in prepared condition.

Simplicity Engineering Co., Durand, Mich., showed two types of vibrating screen for heavy duty requirements. In (*Please turn to page* 63)

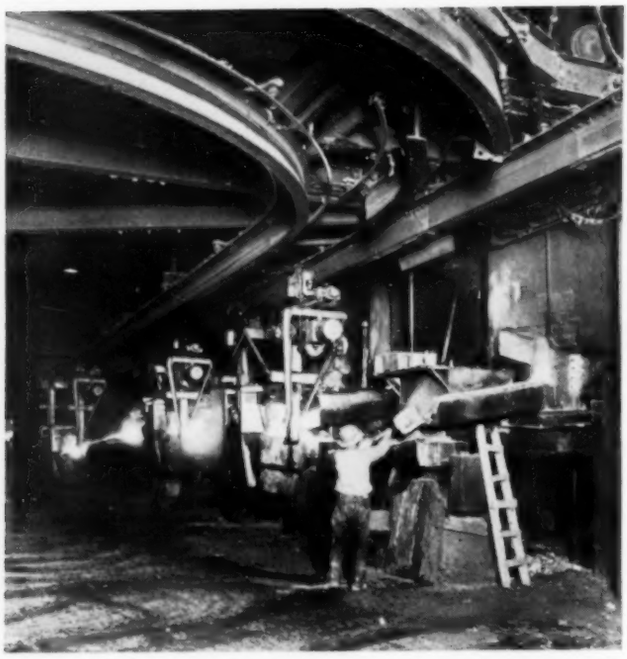


Fig. 1—Two batteries of six cupolas are used alternately

Cupolas Supply Molten Iron Continuously

By PAT DWYER

APPROXIMATELY 2000 tons of iron are melted every 24-hour day in the Chevrolet gray iron foundry at Saginaw, Mich. This represents the culmination of an expansion program that began almost immediately after the foundry was placed in operation in 1919. This original installation included four cupolas lined to 66 inches. With one pair of cupolas in blast and one pair under repair on alternate days, the required amount of 200 tons of iron readily was melted. By increasing the diameter, introducing improved melting technique and operating the cupolas over longer periods, the daily tonnage steadily was pushed upward to keep pace with the increased production on the molding floors, until finally the apparent limit was reached when the four cupolas melted 700 tons per day.

Installation of two additional cupolas relieved the pressure to some extent, but in a comparatively short time the steadily rising demand for castings exceeded both melting and molding facilities and duplicate additions to both these departments were made. At present two 6-battery cupola units are in operation melting iron for the avalanche of molds flowing over the conveyors almost continuously throughout the 24-hour day. One battery of cupolas serves the old foundry, while metal from the second battery is distributed principally in the new section. Through suitable switches on the monorails the molten metal from any of the cupolas may be diverted to any part of either section.

To allow time for cooling, for patching and repairs, only six cupolas are in blast at one time. These melt continuously for 16 to 24

Fig. 2—Ventilation pipes, also two of the conveyor hoods under which the poured molds pass are shown in the foreground molds are assembled and poured on 14 conveyors

hours after which the bottoms are dropped and six others placed in operation. Blast for the cupolas is supplied by motor driven direct connected positive pressure blowers housed on the mezzanine floor below the charging platform. A relief valve on the blast pipe back of each cupola is connected to a pipe which discharges into an expansion chamber and thence through an opening in the wall to the atmosphere. A current of cold air from a fan is driven through a horizontal header and thence through a smaller vertical pipe over the space occupied by each of the slag tenders at the back of each cupola.

All Cupolas Lined to 78 Inches

In preparing for the present arrangement, the shells of the old cupolas above the charging door were left intact, but were replaced with 102-inch diameter shells below the charging door. Shells of the second battery of cupolas are 102 inches in diameter throughout their entire length. All the cupolas are lined to a diameter of 78 inches and boshed or constricted immediately above the tuyeres to a diameter of 66 inches. The average melting speed is 22 tons per hour, but by manipulation of the blast may be increased or decreased to a considerable extent at any time to correspond with activities on the molding floors.

Under normal operating conditions each cupola melts 350 tons in an elapsed 16-hour, or two shift period. On many occasions this has been increased to 460 tons when the cupolas were in blast during three shifts, while on an exceptional occasion one cupola running continuously for four shifts melted 640 tons of iron.

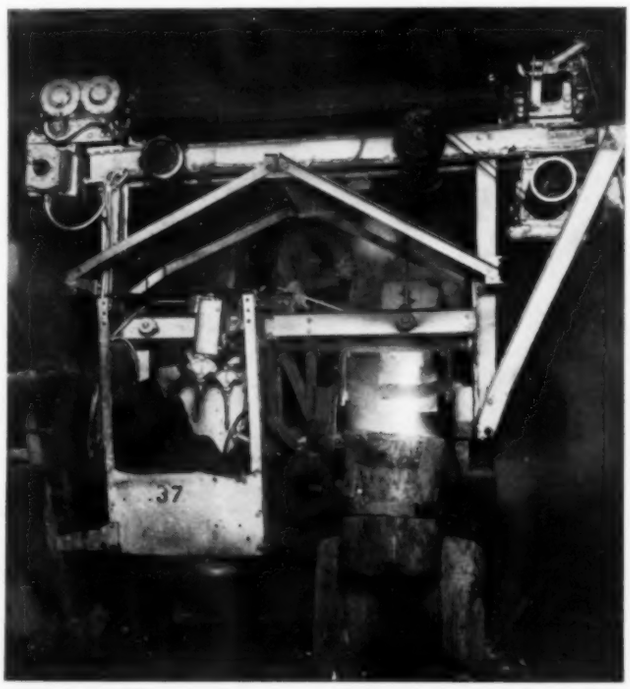


Fig. 3—Electric cranes convey the metal from the cupolas to the pouring stations where it is transferred to smaller ladles for pouring the molds

Fig. 4—Each cupola is equipped with an extension swivel spout to serve the ladles on the outer trolley line

As shown in Fig. 6 in the preceding installment of this series in the October issue, the flow of materials in the foundry is from east to west, commencing at the pig iron and scrap yard at the extreme east and ending in the cleaning and shipping room at the extreme west. The iron yard is arranged in duplicate with each section extending in line with the charging platform of each battery of cupolas. Each section is covered by a 10-ton crane, one with a span of 65 feet, the other 70 feet. The crane runway for each installation is mounted on columns 22 feet between centers. Imaginary lines between opposite columns serve to divide the various piles of pig iron and scrap from each other. A transfer crane, also with a capacity of 10 tons and located close to the inner or foundry end of the yard forms a connecting link between the two sides of the yard. This crane equipped with a magnet also is employed to lift hot scrap from a tunnel extending from the yard to a point under the shakeout in the foundry. The scrap is carried in trucks through the tunnel.

Materials Assembled in Charging Boxes

Since both batteries of cupolas are operated in a similar manner, a description of the methods employed on one will serve for both. The yard crane delivers the pig iron and scrap to a series of bins erected above the charging platform. The bottoms of the bins are set on a slant to facilitate loading the charging cars by hand. One of these cars is provided for each cupola and moves on a track extending from the cupola door to the outer edge of the charging platform.

The car is fitted up as a scale with a number of beams or levers on which the movable blocks

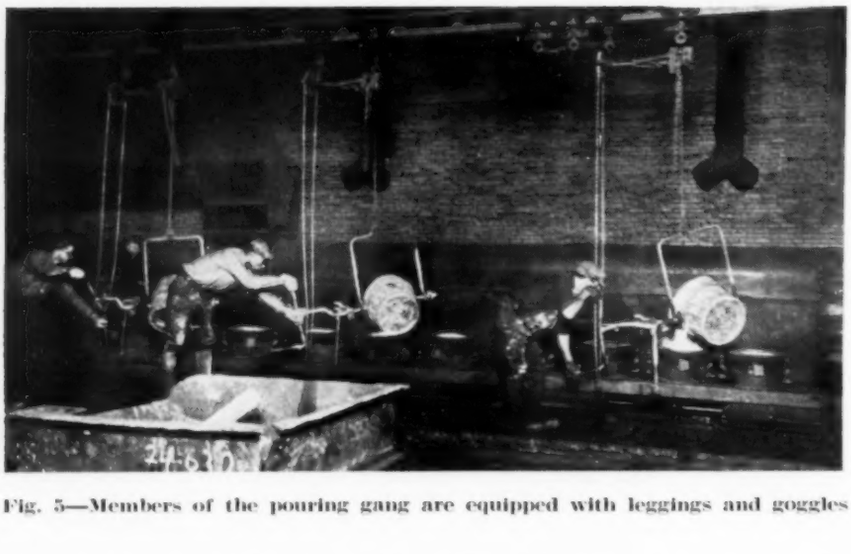


Fig. 5—Members of the pouring gang are equipped with leggings and goggles

are set to any predetermined weight. A number on each beam corresponds to the material for each component part of the charge. A card attached to the car informs the attendant what materials are required for any given day or part of a day. For example the card is marked 2, 4, 6, 8. The driver spots the car supporting the empty charging box under bin No. 2. The attendant slides material from that bin into the box until the beam rises. The car and box then are moved under No. 4, 6 and 8 bins in turn and the process is repeated. In this manner the hazard incident to the human element in making up the charges is eliminated.

The electrically operated loaded car then moves forward and comes to a stop in front of the charging door of the cupola. This opening 4 x 10 feet is protected by a screen door suspended from rollers on a beam. A charging crane moving into position above the box automatically pushes the door to one side. Two slings engage the sides of the box, lift it from the car and carry it forward into the cupola where the sides rest upon two beams. The bottom is released and the charge falls upon the material already in the cupola.

While the box is suspended from the crane a pneumatic ram pushes an empty box from its resting place on to the charging car, which then returns to the bins for another load. The charging crane withdraws the box from the cupola and deposits it in position in front of the pusher and also closes the screen door. The cycle of operations is repeated until the last charge for the day is placed in the cupola.

Coke and limestone are charged through a door in the opposite side of the cupola. These ingredients stored in overhead bins are loaded by gravity into the charging pan equipped with a scale. The operator pulls a pendent rod which opens the gate and closes it when the required weight of coke or limestone is in the pan. A screen door mounted on small wheels at the bottom is pushed aside by hand and the coke and limestone are deposited on each charge of iron. With occasional exceptions for special purposes, the standard charge of iron is 3000 pounds. The coke charge weighs 375 pounds, a ratio of 1 to 8 and the limestone weighs 90 pounds, or 3 per cent of the weight of the iron.

Minor changes in blast volume and weight of coke are made from time to time to compensate for varying humidity in the atmosphere. The number of pounds of coke required to dissociate a given number of grams of moisture from varying volumes of air per minute are shown in Fig. 7. This calculation is based on the equation:

$$H_2O + C = H + CO - 5900 \text{ BTU}$$
$$18 + 12 = 2 + 28$$

1 lb. carbon requires 1.5 lb. H_2O to form 0.167 lb. H and 2.33 lb. CO

1 lb. H_2O requires 0.666 lb. C.

In the chart prepared (*Please turn to page* 80)

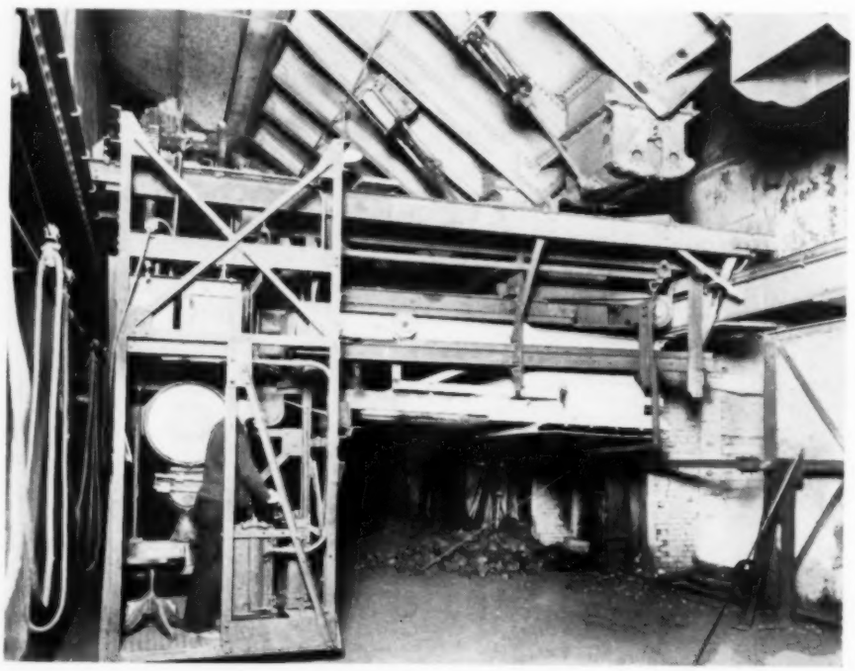


Fig. 6—The coke charging device weighs the coke automatically as it is received from overhead bins

Gray Iron Foundry Cost System

Code authority and administration approve uniform costing and estimating methods

FIRST part of a uniform cost and estimating system for the gray iron foundry industry, recently approved by the code authority of that industry and the administration of the NRA, was presented on page 45 of the October issue of THE FOUNDRY. The remainder of the system is presented in the following:

Miscellaneous Notes on Cost Procedure

(Applying to both Simplified and Standard Procedure)

I. Special Handling of Loss and Delivery Returns

1. Shop Scrap and Defective Castings Returned

The cost of shop scrap and defective castings returned is handled as a separate item of cost and allocated directly to individual jobs by estimating the percentage of loss on each pattern. Defective castings returned should be charged to a separate account and handled as a deduction from sales. There is no cost account for shop scrap, since departmental costs are based on good castings produced.

2. Delivery Expense

This is handled as a separate item of cost which is determined separately for each job. A separate account should be set up for delivery expense and handled as a deduction from sales. The cost of drivers, taxes, insurance, depreciation on trucks; repairs to trucks; gasoline; oil, and all other trucking expense should be charged to this account; also all hired trucking, freight, or express outward.

II. Pattern and Flask Work Performed for Customer

All patterns or flask work performed for customers must be charged for at a price which is not less than the cost of direct labor and material plus an adequate amount of overhead.

III. Subsequent Processing Operations

All subsequent processing operations performed on castings, such as testing, drilling, machining, assembling, annealing, japanning, plating, polishing, etc., must be charged to customers at a price which is not less than the cost of direct labor and material plus an adequate amount of overhead.

Note: It is recommended that the rates charged for truck delivery, pattern work, flask work, or any subsequent processing work performed on castings should not be less than the current rates commonly charged for similar work by the local truckmen, pattern shops, carpenter shops, machine shops, platers, etc., who handle such work on a commercial jobbing basis.

IV. Total Cost

The total cost of any individual job must include the cost of the rough castings f.o.b. foundry, plus actual delivery cost, plus the cost of any pattern or flask work, or subsequent processing performed on castings. Violations of the code will be checked up on the basis of this total cost.

V. Net Price

The selling price which must be not less than cost, shall be the net price after all discounts and allowances have been deducted. Attention is called to section 6, article VI of the code which prohibits cash discounts higher than 1 per cent, or for payments made beyond 30 days from date of shipment; also to sections 2 and 3 of article VI referring to allowances.

VI. Depreciation

1. Basis for depreciation shall be actual cost, including freight and installation, except that in the case of plant and equipment acquired at an abnormally low price the basis shall be the fair replacement value of such assets.

2. Where flat rates are used for total buildings and total equipment the minimum rates of depreciation shall be as follows:

Buildings and Building Equipment

	Per Cent
Brick, concrete or steel frame	3
Masonry with frame interior	4
Frame	4½
Corrugated iron	10
Equipment—All others (Flat Rate)	10

Where classified rates are used, the minimum rates of depreciation shall be not less than the rates listed in the report of the bureau of internal revenue, dated January, 1931, entitled "Depreciation Studies."

3. The complete writing off of plant and equipment by the use of (*Please turn to page* 72)

Laying the cast iron test pavement on the campus of the University of Minnesota

Cast Iron Test Pavement Laid

Section 30 feet long is surfaced with iron blocks at University of Minnesota

By E. W. DAVIS
University of Minnesota

WHAT is thought to be the first cast iron pavement in the United States was laid Oct. 5 on the University of Minnesota campus on Fifteenth avenue at the intersection with Washington avenue. This is a city street running through the campus and carries considerable traffic, practically all of which is automobile. Fifteenth avenue slopes down on a 6 per cent grade to the intersection with Washington avenue, which is a through street. All traffic moving down the hill on Fifteenth avenue must stop at the intersection and the cast iron pavement is placed where the traffic stops. The cast iron surface, 24 feet wide, is laid between concrete gutters and extends up the hill 30 feet. Previously, creosote block had been used for that surfacing and had proved unsatisfactory. The entire hill now has been surfaced with concrete with the exception of the 30-foot section at the bottom which is surfaced with cast iron.

The cast iron blocks used for this surfacing are of the type made by Iron Paving Ltd., London, England. Sample blocks were received from England and the design practically was duplicated for that paving job. Blocks are in the form of an equilateral triangle, 11 5/8 inches on a side on the upper surface and 11 3/4 inches on a side on the lower surface or base. They stand 1 7/8 inches high and are supported on 1/8-inch bosses on each of the three corners. They are cored out and ribbed on the underside, and the upper surface is provided with diamond-shaped studs 1/2-inch high. The castings weigh about 11 pounds each. It is also necessary to make half castings, both right and left to square up the paved surface at the curb lines.

Aluminum metal plate patterns were made following as closely as possible the sample castings received from England. The larger patterns were put on one plate and the right and left half patterns both were put on a second plate. Green sand molds were made on a molding machine, one man putting up about 120 flasks a day. Molds were made with the diamond-studded surface in the cope. A riser was placed in the center of one side and the pouring gate was placed in the center of another side. The drag was made of rough sand but the sand

was screened for the cope. No difficulty was encountered in casting the blocks, the yield being about 98 per cent good castings. Analysis of the metal used was changed several times and will be discussed later.

For the test pavement 1666 castings were required, 1598 of the full castings, 34 right hand, and 34 left hand. About ¼-inch of hot asphalt was spread on the concrete surface and the castings bedded in that material while it was still hot and soft. The blocks were laid at 12-inch centers crosswise and at 10½-inch centers lengthwise of the street. This left cracks between the blocks about ¼-inch wide at the bottom and ½-inch wide at the surface. These cracks were filled with hot asphalt. A crew of six untrained men laid this 80 square yard area in one day, and it was estimated that with a little more experience 200 square yards could be laid per day.

Asphalt According To State Specifications

Specifications for the asphalt used for the base coating and crack filler were as follows:

Minnesota state high specifications 136.03
Softening point .....50 — 70 degrees Cent.
Penetration at 25 degrees Cent. .....85 — 100
Penetration at 0 degrees Cent. .....
.....200 grams—1 minute Not more than 35
Penetration at 40 degrees Cent. .....
.....50 grams—2 seconds Not more than 300
Solubility in carbon disulfide .....99.5 or more
To material was added 20 per cent of celite

No difficulty was encountered in laying the blocks except that due to the slope of the hill the asphalt used to fill the cracks, if too hot, tended to flow down the hill and out of the cracks at the bottom. It is desirable to have this asphalt as hot as possible so that it will adhere tightly to the blocks and to the asphalt base covering the concrete. If properly applied, this asphalt makes an air-tight seal of the space under the castings, which is stated by the British engineers to be important.

Analysis of the metal in the castings received from England was as follows:

Elements	Casting No. 1 Per Cent	Casting No. 2 Per Cent
Total carbon	3.35	3.51
Graphitic carbon	2.56	2.85
Combined carbon	0.78	0.66
Phosphorus	0.113	0.173
Sulphur	0.110	0.144
Silicon	1.83	2.06
Manganese	0.89	0.78
Copper	0.45	0.00
Molybdenum	0.00	0.20

The brinell hardness was 236 on the surface of the studs and 207 on the inside of the castings. The fracture was rough and rather coarsely crystalline.

This chemical analysis is a little unusual for ordinary castings made in local foundries. The phosphorus is considerably below normal foundry practice and the manganese is a little high. Presence of copper in one casting and molybdenum in another probably has little significance. The quantities were so small as to make their use of doubtful value and they were, therefore, disregarded in making the castings for local use. It would be a simple matter to purchase pig iron that would melt down to about the analysis indicated, but the cost of pig iron in Minneapolis is about $21 per ton. These castings sell in England for about 15 cents each or 1.37 cents per pound, which is $27.40 per ton. It is evident that to duplicate this analysis in local foundries would cost around $60 per ton, making the cost of the blocks prohibitive.

Since the main object of this test pavement was to determine its suitability as a surfacing for motor vehicles, especially in the winter and in wet weather, it was decided to modify the phosphorus analysis of the castings so that they could be cast from scrap metal at a considerable saving in cost.

From the experience in England and France, it appears that from the standpoint of wear no special analysis of the metal is required although one company is now hardening the studs to a brinell of 360. Machinability is not important and the static load which the castings must stand can be carried with metal of nearly any analysis. However, the analysis of the metal is important in determining the resistance of the castings to shock.

Castings Tested on Impact Machine

An impact testing machine was set up in the laboratory of the mines experiment station. This consisted of a 2-inch pipe about 5 feet long set vertically about 6 inches above an asphalt mastic floor. A piece of 2-inch shafting about 24 inches long and weighing 20 pounds could be dropped through this pipe from any desired height up to 40 inches. The casting to be tested was placed on the floor in such a position that the entire blow would strike on one stud located approximately in the center of the casting. One English casting and a number of the local castings were tested on this machine. The English casting having the analysis of No. 1 cracked on the second 40-inch drop of the 20-pound weight. All of the local castings, regardless of their analysis, broke on either the first or second drop of the weight. As previously stated, the analysis of the local castings was varied to some extent for test purposes, the average of all the castings lying between the limits shown in the following table:

Elements	Per Cent
Total carbon	3.20 - 3.50
Graphitic carbon	2.70 - 2.95
Combined carbon	0.55 - 0.65
Phosphorus	0.40 - 0.60
Sulphur	0.09 - 0.125
Silicon	2.00 - 2.70
Manganese	0.50 - 0.60
Chromium	0.00 - 0.40

(Please turn to page 77)

Use Plaster for Foundry Patterns

Patternmaking expense reduced to minimum on neuel posts and similar hollow castings

AN IMPROVED method of making newel posts and other similar castings of hollow rectangular cross section which carry ornamental figures on all four sides is shown in the accompanying illustrations. With minor modifications the method also is applicable in the production of castings of practically any other cross section. Briefly it may be stated that the outside face of the casting is made in flat, comparatively thin dry sand cores assembled in a green sand mold.

In the ordinary or usual method the two side panels of a newel post pattern are attached by screws or dowel pins. These screws or pins are removed after the drag has been partly rammed and as a result the side panels remain in the mold after the main part of the pattern has been drawn out. The side panels then are drawn in horizontally for a short distance and then lifted out of the mold.

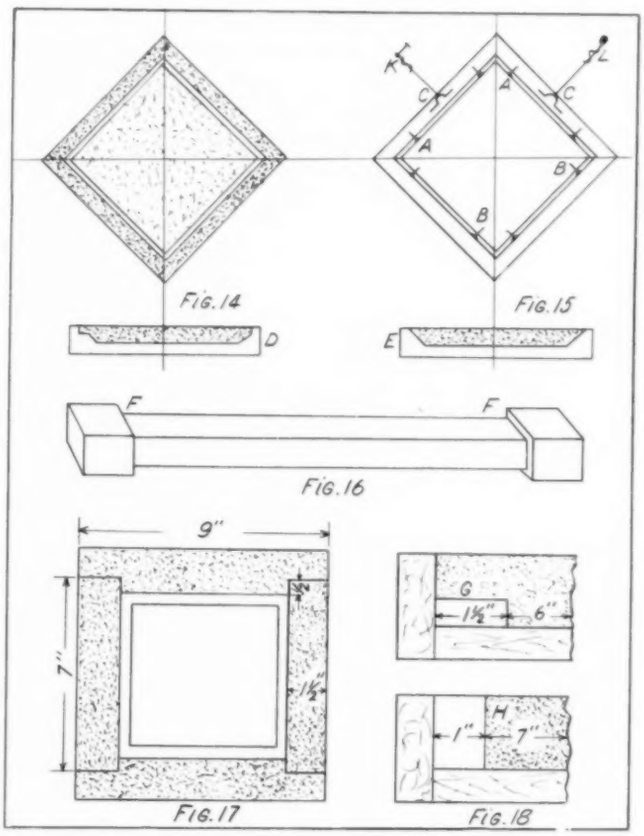
In a second method the pattern is made as a unit and molded in a diagonal position with one half of the pattern in the drag and the remainder in the cope. In some instances the pattern is split on a diagonal line so that one half of the pattern may be lifted with the cope.

The main objection to either of these patterns is the excessive amount of hand work required in duplicating the design on all four sides. In the improved method shown in the accompanying illustrations this part of the work is reduced to a minimum. Also the actual making of the mold may be entrusted to a comparatively unskilled molder, operating a jolt machine.

Usually the ornamental figure is a repetition. Therefore instead of preparing a pattern of the entire panel, the modeler prepares a single unit of the design in clay on a flat board. The section thus prepared may be half, one third, one fourth or any other component of the whole. A plaster cast is taken from the clay to serve as a negative. A positive impression in plaster then is taken from the negative. This positive is a replica of the clay figure and with suitable side and end walls serves as a shallow corebox.

In one type of corebox *D* Fig. 14, a step or shoulder at each side forms a guide which locates each core properly in relation to the adjoining pair of cores. The corebox shown at *E* Fig. 15, is a simpler shape and forms a miter joint which usually is sufficient to locate the cores properly in position.

The pattern for the newel post is an elementary square or rectangular box the required length including the core prints. The cross sectional area of the box equals the cross sectional area of the proposed casting, plus the thickness of the slab cores. Thus if the casting is 6 inches square and each core is 1½ inches thick, the pattern dimensions will be 9 x 9 inches. The center core Fig. 16 which determines the thickness of the casting, also determines the total

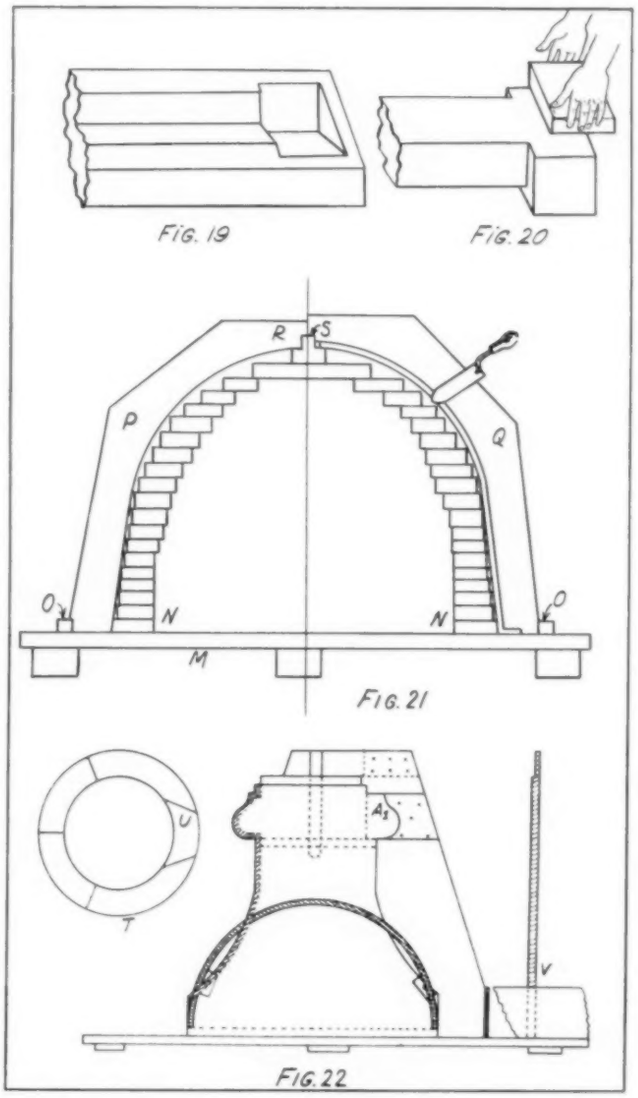


Figs. 14 and 15—Alternative methods of assembling covering cores where the casting is molded in a diagonal position. Figs. 16—Center core. Fig. 17—Method of locking cores where column is molded entirely in the drag. Fig. 18—Corebox with loose pieces for cores shown in Fig. 17

length. An enlarged section *F* at either end forms the core print and also a resting place for the thin outside slab cores. This type of print presents many advantages over the usual type formed directly on the pattern and corresponding in size to that part of the center core which occupies the inside of the casting.

Two methods of making this center core are shown in Figs. 19 and 20. Due to the shoulder at each end, the core cannot be formed directly on, or rolled over on a plain flat core plate. To overcome this handicap the corebox in one method is built as shown in Fig. 19. Two half cores are made in this box. After these halves are dried on flat plates they are pasted face to face to form a complete core with a diagonal parting or joint line.

With the exception of the upper shoulder, the entire core in the second method may be formed in a single corebox and rolled on to a flat plate. The slab for the upper shoulder is made in a separate corebox. After the main core has been dried the slab for the upper shoulder is placed in position as shown in Fig. 20. It is not necessary to paste this slab core in place since it will be located accurately by the surrounding green sand.



Figs. 19 and 20—Alternative methods for making center core with shoulder at the end. Fig. 21—Foundation, wood frame and sweeps for forming plaster pattern for dome. Fig. 22—Rigging for making plaster lamp base pattern

Alternatve methods for anchoring the side slab cores where the mold is made from a split pattern molded diagonally are shown in Fig. 15. A set of slab cores is placed in the drag. The long center core then is lowered into position. The prints on the ends of the center core will hold the outermost slab cores in place. The shoulder on the style of core shown in Fig. 14 will hold the intermediate cores in position. For additional safety it may be advisable in some instances to place small chaplets between the center and slab cores. Copper nails or small pieces of wire stuck in the center core while it is green and allowed to project the required distance as at *B B* Fig. 15 will answer the purpose. Cores in the cope may be supported in a similar manner with the single exception that the chaplets project from the slab cores as shown at *A A*. A preferable method of holding the cope cores is to fasten them back with wires attached to suitable staples as shown at *C C*.

In many instances the foregoing procedure may be simplified still further. Cores for all four sides are placed against the sides of the pattern and rammed in that position. In this instance of course the cross section of the pattern corresponds simply to the cross section of the proposed casting. Wires attached to nails in the bars *K* or projecting through the cope and twisted around short rods *L* anchor the cope cores in place. Thus when the mold is parted and the pattern removed, the only work required is to place the center core.

Loose Pieces in Corebox

Although the slab cores shown in Figs. 14 and 15 are designed specifically for use with a pattern molded diagonally, they also may be employed where the pattern is molded in the usual upright position and entirely in the drag under a flat cope. However, the style of core shown in Fig. 17 is preferable when the mold is made in this position. The shoulders at each of the four corners lock the four cores in position and thus prevent any shift in position, or of any metal leaking in behind the cores.

A single corebox serves for making each of the four cores. The blocks *G* and *H* Fig. 18 are loose. Similar blocks of course are placed in the opposite side of the box but are not shown in the illustration. With blocks *G* in position the two cores are made for the top and bottom. Block *G* then is removed and replaced by block *H*. With this block in position at each side of the box, the two cores are made for the sides. As in the former instance it is optional with the patternmaker to prepare a pattern 9 inches square or 6 inches (*Please turn to page* 70)

Questions and Answers

Covering important problems found in all phases of modern foundry practice

This department includes problems relating to metallurgical, melting and molding practice encountered in making castings. Questions from subscribers addressed to the Editor of The Foundry will be answered by members of the editorial staff, supplemented where occasion requires by the advisory staff.

Composition May Be Determined by Experimentation

We have been requested to make a bronze tub for turning into piston packing rings. These rings after turning are cut into sections and are held against the cylinder walls by a steel expander ring. Superheated steam is used. What mixture would you recommend for this purpose?

It is difficult to suggest the preferred alloy for the service you outline, as we do not know many of the details. You speak of superheated steam. This presupposes a relatively high temperature. Piston rings have been made from bronzes but with indifferent success. Presumably the need for bronze piston ring is to reduce the wear between the ring and the cylinder wall. Therefore, a bearing metal in the ring is desired. There is no spring in such metals, particularly when the temperature increases, since the higher temperatures tend to anneal any spring from the castings. Such alloys as 80 per cent copper, 10 per cent tin, 10 per cent lead, and 88 per cent copper, 10 per cent tin, 2 per cent lead, have been tried. In most instances, lack of spring has defeated the value of the ring.

In the instance you describe, this spring is to be supplied by a steel ring. Therefore, it may be possible that any good bearing metal will increase the wearing life of the piston ring and reduce the wear on the cylinder wall. However, it would be a matter for test to determine what alloy is most successful.

A further problem arises in the question of the structure of the metal in the cylinder wall. If the cylinder wall is a soft gray iron high in free carbon, it would require a different bearing bronze than if the wall were of other materials or other forms of iron. We hesitate to predict that a given alloy will be successful since so many trials have been made and later changes seem desirable. Frequently the use of bronze has been abandoned for one reason or another.

Thus you will see that this problem is one of those cut and try problems; or in other words, anything that is finally found to be of value will have to be uncovered by a series of tests.

Dampness on the Face Of the Mold Causes Rat Tails

About 20 per cent of our table castings 14 inches square and ¼-inch thick show rat tails on the cope side. Molds are made on a jolt squeeze machine in steel flasks and are poured two up. We have tried various grades of sand with varying results so far as the surface condition is concerned, but the rat tails persist with all.

From the data and sample submitted we believe that the defects are caused by a little too much moisture in the sand. The steam rising through the iron creates a slight film of dross which is rolled along to where opposing currents of iron from the two gates meet each other. The weight of iron then is sufficient to prevent any further steam from rising through the metal. The dross already created and rolled into one or more irregular strips is pressed against the cope face of the mold and forms an impression in the surface of the casting.

The obvious remedy is to reduce the moisture content of the sand to a point where the amount of steam generated will be absorbed readily in the sand. It is apparent that sand with a much higher moisture content may be used in molds where the opportunity for escape of steam is greater, than in a mold practically entirely blanketed by a flat plate. We assume that the sand in the mold is rammed fairly hard to prevent the casting from straining. To counteract that condition the permeability of the sand should be greater than otherwise might be nec-

essary. An ideal sand for your purpose would show a permeability of approximately 100, moisture 4 per cent and green compression strength of 4 to 4.5. Unless actual experience has indicated that pouring two up is required to prevent the plate from warping, a single wedge or finger gate on top, or a single runner with a number of branch gates on one side, should be sufficient.

Change Gate To Prevent Small Internal Shrinkage

We are sending a malleable radiator nipple blank which we have broken in two. The two halves are from the same casting. The casting has small internal shrinkages in the center at the ribs which are not large, but we would like to eliminate them if possible. We have tried everything we know to overcome this trouble such as different gatings, different depths of flasks, etc., and have checked up with large foundries making the same kind of castings. Can you suggest anything to correct this difficulty?

Examination of the nipple shows that the gate is about one-half inch away from the internal projection, and that the shrinkage in that projection or rib is practically nil. Therefore, it is only natural to assume that if the casting were gated directly into the rib, no shrinkage would be evident as the gate would feed the casting properly. The greatest shrinkage is in the rib opposite the gate, and by the same reasoning that could be overcome by placing a gate on that side.

Another way that the trouble could be overcome is to place blind risers above each of the ribs. Make them with the same cross-sectional area as the ribs, say about 1-inch high. Also instead of gating on both sides, try such a blind riser over the rib on the opposite side to the gate.

Ratio of Tin to Copper Remains About the Same on Remelt

We have a quantity of gates, risers, and castings which analyzes, copper 83.78 per cent, tin 15 per cent, lead 0.84 per cent, phosphorus 0.38 per cent, zinc trace. We are anxious to know approximately what the resulting analysis will be in a remelt with no other chemical elements added. We melt in a coke fired furnace and it usually takes from 3 to 4 hours to pour the metal starting with a cold furnace.

Of course, it is speculative as to the exact analysis resulting from remelting the metals you describe because actual practice in your plant would influence the results. The most practical way to find out obviously would be to remelt some of this metal and analyze it after it has been remelted under your own conditions. Under average conditions, the copper and tin probably would be found to have the same ratio to one another. Lead largely would be carried off by vaporization and oxidation, as would the phosphorus. Theoretically this is what happens except that in the presence of a trace of zinc there might be some difference noticeable in the amount of lead that would disappear.

Properly melted, the alloy should appear much as it does in the present gates, risers and sprues, except that the lead probably would be 0.15 per cent, and phosphorus probably from a trace to 0.05 per cent. Of course, some of the copper does disappear, as does some of the tin, but the ratio of these two metals to one another probably would remain approximately the same.

Bubbles Enclosed in Slag Envelope Cause Small Holes in Metal

We are forwarding part of a casting containing several small holes on the drag face. However the same form of defect occasionally appears on the cope face. We melt the iron exceedingly hot in a 22-inch cupola, but usually cool the metal in the ladle before we pour the heavier castings by stirring in gates and pieces of scrap. We use a cleaner in the receiving ladle and employ what we consider a good gating system. The ladle linings seem to develop a quantity of slag.

The defect in the casting submitted for examination is caused by slag inclusions. Not slag in the solid state, but bubbles inclosed in thin slag envelopes. The primary cause of the trouble is the presence of slag in the metal, and this slag in turn results from the use of the cleaning agent in the receiving ladle. The iron in the receiving ladle should be carefully stirred and skimmed, or preferably a teapot ladle should be employed for the purpose.

The trouble is accentuated by the boiling ac-

tion of the pouring ladle linings. The bubbles become trapped in slag envelopes and some of them are carried into the mold. Where the metal is cooled before it is poured some of these envelopes become anchored to the bottom of the mold. Exceedingly hot, fluid iron will float the others to the top and in some instances the pressure will explode them against the face of the mold, thus leaving little or no evidence of their former presence. The remedy is to stir the iron and skim it thoroughly before it is poured. Also to provide ladle linings that will not cause agitation of the metal.

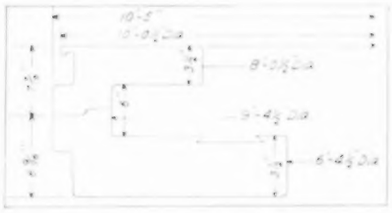
Iron Castings Shrink Under the Heads

We shall appreciate your opinion on the cause of shrink holes under the risers on two large cast iron rings shown in section assembled, on the accompanying sketch. These rings are made in various sizes. The one shown is 10 feet 5 inches outside diameter. The upper ring is 8 feet, ½-inch inside diameter and the lower ring is 6 feet 4½ inches. The castings are poured from a mixture containing 30 per cent steel and which shows a silicon content of 1.30 per cent. The molds are made in the floor in green sand. They are gated on the inside and are fed through six risers 6½ inches at the neck 10 inches at the top and 12 to 14 inches high.

The ring castings shown in the sketch are so uniform in cross section that they might be made in open sand molds without either copes or risers. They probably would sink a little in the center on the top side, but an extra ½ or ¾-inch on the top of the pattern would provide sufficient metal to take care of that. Since the casting is finished all over, the removal of this extra metal might be cheaper than your present method involving a cope, or a set of covering cores; preparation, filling and removal of the risers and other items in the preparation of a covered mold. This method would be quite satisfactory if a small shrinkage cavity in the center of the casting was not objectionable. For all practical purposes the shrinkage cavity in the center would not affect the usefulness of the casting, but it might fail to pass inspection under certain conditions.

Your present set of six risers, 6½ inches at the neck and presumably spaced equidistantly over the top of the casting, are ample to insure a perfectly solid casting. In fact smaller risers might be employed if each one was fed with a rod for a few minutes.

From the evidence submitted we are inclined to the opinion that the shrink holes are blow holes. The sand may be tight, or it may be rammed too hard. In either case the steam cannot escape through it readily and it bubbles up through the iron.



It is possible that the shrink hole really is a blow hole caused by steam

The metal in the vicinity of the risers is the last to solidify and therefore the last place for the steam to try to escape. In all probability the pattern is leveled in the hole in the floor. Sand is tucked up against it loosely. Then the pattern is removed and the sand bed is covered with a thickness of facing sand. The pattern then is returned to place and pounded down with a sledge hammer. The result is a hard face. On account of the shoulder this mold should be vented more than usual. One way would be to lay a cinder bed in the bottom of the hole and then vent the face of the mold all over before rapping the pattern down into place. The second way would be to vent the face as in the first instance and then run a row of horizontal vents from the joint and under the pattern before removing the pattern from the mold. If the steam is given a chance to escape freely from the sand under the casting it will not bubble up into the metal to disturb it and will not leave holes under the risers.

Average Weight Of Brass Casting Gates

We shall appreciate any information on the average proportion existing between the weight of sprues and gates, and the total metal poured. We make castings in various brass mixtures. The largest amount used is the 85-three-5 metal. The average casting weighs 1¼ pounds and the average mold contains four castings.

Average weight of the sprue and gates in a mold containing four brass castings with a total weight of 5 pounds will be a little over 2 pounds. The weight of sprues and gates as compared to the weights of casting will vary to a considerable extent, depending on many factors including the composition of the metal, number of castings served by the sprue, shape and size of the castings.

Certain castings because of the shape, size or composition of the metal require feeding risers. In these instances the weight of the sprue, gates and riser may equal the weight of the casting. A sprue and single gate on a casting will not weigh as much in proportion as a sprue attached to a number of branch gates required to distribute the metal over a large area.

Taking the problem by and large over a large quantity of miscellaneous castings, the average weight of the metal in the sprues and gates will range between 25 and 33 per cent of the total amount of metal poured. The proportion will be less on all heavy castings, and will be higher on extremely light castings.

Must Drive Out Water from Plater Mold

We have experienced trouble making small metal castings in plaster of paris molds as the metal bubbles and blows. The castings are too small and have too many undercuts to be made in sand. It seems metal will not set properly in these plaster molds although we tried baking and every possible way of drying the mold. Will you kindly tell me if it is possible to use a plaster mold or if the plaster must be treated in some way?

Casting metals in plaster paris molds is more or less commonly done where exact reproduction of detail is the important factor and not the cost thereof. There are many details that must be carefully observed if such castings are to be satisfactory.

The mold must be sufficiently dry not only to drive off uncombined moisture, but also a vast amount of water absorbed in the hardening of plaster of paris, which is known as the water of crystallization. After this water has been driven off, if the mold is allowed to cool, it reabsorbs the moisture from the air and, therefore, once the mold has reached a temperature sufficient to have driven off all the moisture present, it should not be allowed to cool appreciably before metal is poured into it. The best authorities give the temperature at which the water of crystallization is driven off as 500 degrees Fahr. or above.

Evaporation of this moisture must be done slowly as, of course, the mold could be very seriously damaged by the generation of the steam pressure within it. Therefore, the usual practice is to make the mold and to dry it slowly in an oven, the temperature of which is gradually raised from just below the boiling point of water, say 200 degrees up to 500 degrees, or a little more. The time necessary for this gradual increase in temperature should be varied. For a thick section, a slow increase is necessary. A thin section will permit of a little more rapid increase in temperature.

It is common to use some asbestos fiber in the plaster paris to increase the strength, but it is not absolutely necessary. It has been found best to have the mold at a temperature when pouring the casting that is sufficiently high to indicate a slight reddish color when viewed in the dark. This would approximate about 800 degrees Fahr.

Viewing Foundry Developments

At Short Range

MODERN technique, especially in the repetition type foundry where molds are poured in endless procession on a conveyor, favors a simplified clamping method for holding cope and drag in position. Instead of the usual parallel flanges or lugs, one of the lugs either on the cope or the drag is thickened at one end and sloped gradually to the other end to constitute a wedge. The cavity in the clamp corresponds in shape. Thus when the clamp engages the two lugs and is moved in one direction it grips the lugs firmly. A tap at the other end releases it. In one installation an upright steel arm attached to the conveyor frame engages each clamp in turn and knocks it off as the mold moves past the arm.

• • •

ONE of the newest sulphite liquor and heat resisting alloys contains copper and lead in addition to chromium and molybdenum. The preferred analysis shows 20 per cent chromium; 1 to 3 per cent molybdenum, 3 per cent and ½ to 2 per cent lead according to the patent. The lead is added in the ladle and is said to reduce the size of the grain, and grain boundaries, and retard grain growth at high temperatures.

• • •

In a paper presented at the recent convention of the American Foundrymens association, the author directed attention to a method of securing solid steel castings with a greatly reduced volume of steel in the risers or sinkheads. The method is based on the theory that gravity plays an important part in feeding the casting, that the top of the casting should be the last place to freeze and that the maximum temperature of mold and metal should be combined at that point. This result is secured by pouring the metal through a gate at the bottom, placing the riser at the bottom, and then reversing the position of the mold after it is filled with metal. Several modifications of the method may be adopted. In one the mold is placed in an inclined position, poured at the low end with an auxiliary gate feeding metal into the riser. After the mold is filled the mold is tilted to the opposite position.

• • •

A LARGE automobile foundry has developed an interesting rig to determine the height of metal in the well of the cupola. One inch carbon electrodes have been inserted through the cupola shell and lining at opposite points on the circumference; the electrodes being placed one above the other with equal spacings throughout the height of the well. Two electrodes at the same level are connected to an electrical circuit and a lamp. Molten metal rising in the well closes a circuit as it reaches each pair of electrodes on the same level, thus causing the light in that circuit to light, indicating the height of metal.

• • •

Aluminum added to gray iron as a deoxidizer causes a highly viscous film to be formed on the top surface of the casting in the cope of the mold. This film acts as a pocket and prevents the gas from escaping. The defect usually will not be found until the surface is machined.

• • •

An iron analyzing as follows: Total carbon 2.75 to 3.00 per cent; silicon 2.40 to 2.70 per cent; sulphur 0.10 per cent maximum; phosphorus 0.10 per cent maximum; manganese 0.60 to 0.80 per cent; nickel 1.50 per cent, and chromium 0.50 per cent, was heat treated by heating to 1550-1600 degrees Fahr., quenching in oil or water and tempering at 850-950 degrees Fahr. Selection of the quenching medium depends on the section, heavy sections being quenched in water and light sections in oil. Brinell hardness in treated casting was 286 to 321, and tensile strength 81,000 pounds per square inch.

• • •

TOTAL carbon content in cupola melts may be controlled through the application of coke reaction temperatures, according to a recent development. Graphs included with the patent show the relation between coke reaction temperatures and carbon in the melt. Reaction temperatures of 750, 725, 700, 675 and 650 degrees Cent. are included, and the curve shows an increase of carbon content as the coke reaction temperatures decreases.

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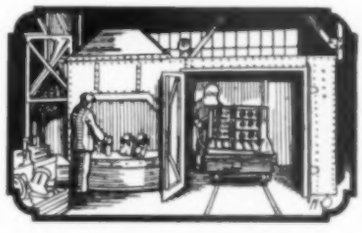
Cast piercing points for seamless tube mills may be made of an alloy steel containing 1 per cent carbon, 17 per cent chromium; 4.5 per cent nickel; 0.35 per cent silicon; under 0.05 per cent sulphur and under 0.04



per cent phosphorus according to a recent patent. The points are quenched from 1050 degrees Cent. in water to increase wearing quality. Points should be heated to 800 degrees Cent. before using to prevent cracking.

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For irons subject to temperatures above 1600 degrees Fahr., one authority claims that between 12 and 16 per cent chromium is necessary to prevent growth.

Men of Industry

Whose Activities Are Making Foundry History

JOHN L. ERNST has been appointed foundry superintendent, Spring City Foundry Co., Waukesha, Wis. Mr. Ernst formerly was connected with Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., Hercules Corp., Evansville, Ind., American Foundry Co., Indianapolis, Buick Motor Co., Flint, Mich.

MELVIN PATTISON, associated with the Industrial Brownhoist Corp., Bay City, Mich., and its predecessor for over 30 years, has been made president of that company.

PAUL M. WEISS, general manager, North Tonawanda, N. Y., plant of the Crane Co., Chicago, has been promoted to assistant works manager of the company's Chicago division.

JAMES D. COLTMAN, Bullard Machine Co., Bridgeport, Conn., spoke before the New England Foundrymen's association at a meeting held at the Engineers club, Boston, Oct. 10 on "Melting and Casting Problems in the Manufacture of High Test Cast Iron."

ALFRED C. RANTSCH, for 16 years engineering sales engineer, Dohler Die Casting Corp., Toledo, O., and for 4 years manager, Barnhart Bros. & Spindler, Chicago, been made vice president and manager of Pressure Castings Inc., Cleveland, a company organized early this year to produce high pressure die castings.

J. P. JOHNSON, foundry superintendent, Westinghouse Airbrake Co., Wilmerding, Pa., has the unusual distinction of being not only the oldest employe of the Westinghouse Airbrake Co. in active service, but superintendent of one of the leading iron and nonferrous foundries in the country. Born in the old 12th ward of Pittsburgh, March 4, 1869, Mr. Johnson is proud of the record that shows 47 of his 65 years as having been spent with the Westinghouse Airbrake Co. He first was employed as a stripper boy in one of the old steel mills at Pittsburgh where he ultimately worked in the laboratory. When that firm discontinued operations he became interested in the molding trade and apprenticed

J. P. Johnson

at the foundries of the Pittsburgh Steel Casting Co.

On Jan. 11, 1887, he became identified with the Westinghouse Airbrake Co., and has had a record of continuous service ever since. At that time the old Westinghouse Airbrake plant was on the north side of Pittsburgh, and in 1890, it was moved to Wilmerding, an eastern suburb. Mr. Johnson served the usual foundry apprenticeship, and has a record of having progressively passed through all the important positions in the foundry. Through those 47 years he played an active part in the improvement of the railroad airbrake and he has made many practical contributions for simplifying molding methods for the intricate airbrake castings.

Since 1925, Mr. Johnson has been foundry superintendent of the Wilmerding foundries which consist of two iron foundries, a brass foundry and an aluminum foundry. Under normal conditions approximately 1200 men are employed. Mr. Johnson has been represented on the committee of the American Foundrymen's association, as well as the Pittsburgh Foundrymen's association.

BEN RATHBUN, vice president and general manager, Chemung Foundry Corp., Elmira, N. Y., recently was elected a director of the Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

H. K. POLLARD, has joined the sales staff of the Treadwell Engineering Co., Easton, Pa. Mr. Pollard has been identified with the sale of steel castings for a considerable period.

E. D. SPICER, formerly assistant works manager, has been made manager of the Schenectady Works, General Electric Co., Schenectady, N. Y., succeeding BURTON L. DELACK. Because of impaired health, Mr. Delack asked to be relieved from the responsibility of that position, and has been transferred to the staff of the vice president in charge of manufacturing where he will devote his time to personnel problems of the company.

Mr. Spicer is a native of Wellsville, N. Y., and was graduated from Cornell university, Ithaca, N. Y., in 1912. Before becoming affiliated with the General Electric Co. in 1924, he was with the Kerr Turbine Co., Wellsville, where he started as a student in the test department and advanced through various positions to factory management.

Approves Code Authority

Code authority of the warm air furnace pipe and fittings manufacturing industry recently has been approved by the National Recovery administration as follows: Carl Weyand, Henry Weyand Co., Waterbury, Conn.; Aaron Cohn, Acme Tin Plate & Roofing Co., Philadelphia; George Hunt, Henry N. Clarke Co., Boston; R. G. Harrison, Reeves Mfg. Co., Dover, O.; E. S. Moncrief, Henry Furnace & Foundry Co., Cleveland; and A. W. Glessner, Excelsior Steel Furnace Co., Chicago.

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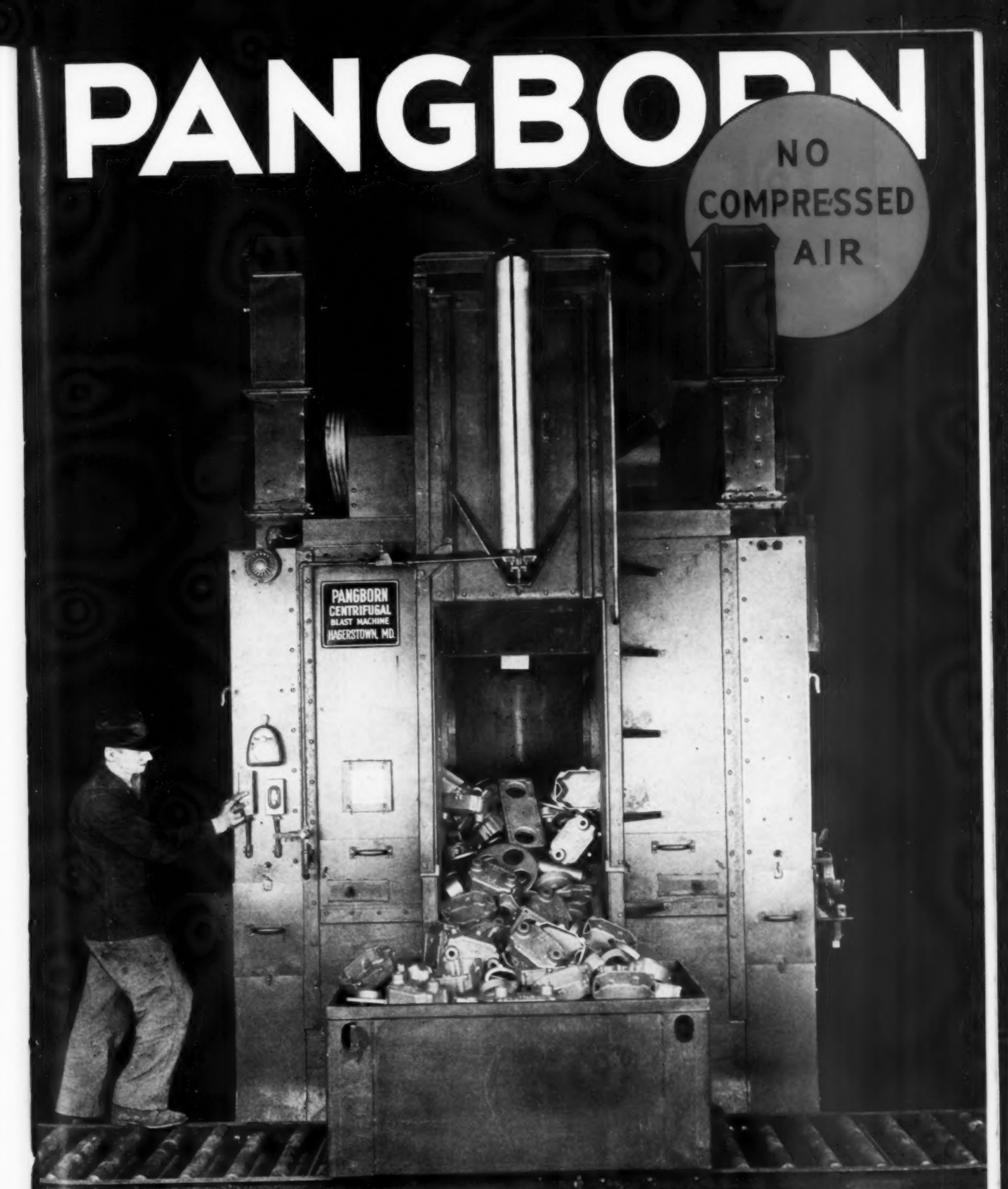
NO COMPRESSED AIR



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● Introduced with great success at the Philadelphia Foundrymen's Convention. The ease with which Big Loads were cleaned in Short Time at exceptionally Low Cost clearly demonstrated the wonderful possibilities of this Centrifugal Blast Machine. Using no compressed air it offers you the lowest cleaning cost per pound of castings—Write for complete description of the ten outstanding points of superiority.

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A. E. Harrison

E. O. Beardsley

Sam Tour

A. F. A. Elects Five New Directors

ELECTION of five new directors of the American Foundrymen's association was announced at the convention and exhibition in Philadelphia, Oct. 24. The following were elected for a three year term: E. O. Beardsley, E. W. Campion, Albert E. Harrison, Frank J. Lanahan, and Sam Tour.

E. O. Beardsley

E. O. BEARDSLEY was born in Salem, Oregon. After serving his apprenticeship as a machinist, he bought a machine shop in his home town and later added a foundry. His next investment was the Klamath Falls Iron works, a foundry and machine shop, where he was in partnership with Mr. Piper. In 1918 when the two men were marketing their newly conceived sandslinger in Chicago, the Klamath Falls Iron works was burned to the ground. The partners then remained in Chicago, establishing the Beardsley & Piper Co., of which company Mr. Beardsley now is president. He is a member of the board of directors of the Foundry Equipment Manufacturers association and the code authority of the foundry equipment industry.

E. W. Campion

E. W. Campion

E. W. CAMPION was born in 1883 and educated in Phillips Andover academy and then in Cornell university, Ithaca, N. Y. He was connected with the Buckeye Steel Castings Co., Columbus, for a number of years before accepting his present position as general manager of the Bonney-Floyd Co., Columbus.

Mr. Campion is a member of the British Institute of Metals, American Society for testing Materials, Steel Founders Society of America, and the British Iron and Steel institute. He has been active in the work of the association, serving on numerous committees dealing with steel castings and molding sand.

Albert E. Harrison

A. E. HARRISON was born in Tipton, Staffordshire, England, in 1866 and came to this country as a boy. In 1899 he was made foreman of one of the pattern departments of the Edward P. Allis Co., to which he had come as an apprentice at the age of fifteen. When the consolidation to form Allis-Chalmers Mfg. Co. took place in 1901, Mr. Harrison became superintendent of all pattern shops. In 1903, he was appointed superintendent of foundries as well as of pattern shops. He took over the duties of his present position as general superintendent of foundries and pattern shops in 1924 after 43 years of service with the company. Mr. Harrison has the longest service

(*Concluded on page* 44)

F. J. Lanahan

NORBIDE
High speed photograph of stream from new iron nozzle—note that stream concentration and abrasive velocity and volume are fair
Stream from the same nozzle after three hours with silica sand. Outlet opening worn to twice original size—stream concentration poor abrasive velocity and volume low
Stream from Norbide Nozzle after 404 hours with sand—outlet diameter worn only 0.032" hundreds of hours of useful life remain—marked stream concentration—high abrasive velocity and volume

(Norton Boron Carbide)

PRESSURE BLAST NOZZLES

They will increase the over-all efficiency of your entire blast cleaning equipment because of:

1. Increased Nozzle Life
2. Decreased Air Consumption
3. Improved Stream Contour and Velocity

THE first feature is due to the hardness of the Norbide nozzle lining—a hardness closely approaching that of the diamond—a hardness that increases nozzle life many hundreds of times, often thousands.

Air consumption is considerably decreased because the opening in a Norbide Nozzle remains practically constant for a long period of time. Users report that they are often able to lower the setting of their compressor as much as ten pounds and that there is in addition a saving in the volume of air consumed—a saving that is often as important as the increase in nozzle life.

Because the opening in a Norbide Nozzle retains its true cylindrical shape and size the stream contour remains concentrated and velocity does not drop.

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record of any employe of that company.

Frank J. Lanahan

F J. LANAHAN, retiring president of the A.F.A., was born and received his early education in Pittsburgh. He then attended St. Mary's academy, Blairsville, Pa. During the World war, he was chairman of the malleable iron industry war service committee and was a member of a number of other committees engaged in war service.

Mr. Lanahan now is president, Fort Pitt Malleable Iron Co., Pittsburgh; president, Davis Brake Beam Co., Johnstown, Pa.; president, Fort Pitt Mine Equipment Co., Jeanette, Pa.; director, Warren Foundry & Pipe Co., Wharton, N J.; and chairman of the board, Auto Tite Joints Co., Pittsburgh, and is connected with numerous other industrial and business organizations. He is an active member of a large number of civic, philanthropic, and technical organizations.

Sam Tour

SAM TOUR is a graduate of the University of Colorado, in chemical engineering and received his master's degree from the University of Michigan after teaching there for 1 year. During the war he served in the metallurgical division of the ordnance department, U. S. army. From 1921 to 1928, he was metallurgist at the Brooklyn branch of the Doehler Die Casting Co. and the next year filled the same position at the Batavia, N. Y., branch. In 1929 he joined Lucius Pitkin Inc., New York, of which he is now vice president and chemical and metallurgical engineer.

Mr. Tour has contributed to technical and trade publications on metallurgical subjects. He is director and past chairman of the Institute of Metals division, A.I.M.E. and is a member of the American Society for Testing Materials, American Society for Metals, Society of Automotive Engineers, and American Chemical society. He is secretary of the Nonferrous Foundry association for industrial recovery.

Moves Detroit Office

District office of the development and research department, International Nickel Co. has been moved into larger quarters in the General Motors Building, Detroit. E. J. Hergenroether is district representative.

Victor G. Vaughan, formerly manager of the appliance engineering division, Westinghouse Electric & Mfg. Co., Mansfield, O., has been placed in charge of operations including development of new products, for the Spencer Thermostat Co., Attleboro, Mass.

Chicago Section Studies Sand Problems

Chicago section, American Foundrymen's association, held its first meeting of the fiscal year at the Medinah club, Chicago, Oct. 4. The meeting was in the nature of a charter smoker, marking the recent acquisition of a local charter in the association by the Chicago group. Plans for the lecture course to be presented by the Chicago section from October to January were discussed.

Gen. T. S. Hammond, president, Whiting Corp., Harvey, Ill., was the principal speaker. Commenting on NRA activities he urged that industry make known its ideas concerning the continuation of the act prior to its formal expiration next June.

Sand provided the topic for discussion at the monthly meeting of Nov. 1. Speakers were Eugene W. Smith Jr., general manager, Eugene W. Smith Inc., Evansville, Ind., and R. K. Akin, Robert W. Hunt Co., Chicago.

Speaking from the viewpoint of the producer, Mr. Smith described the process of development of sand deposits as well as the characteristics of sand from various geographical locations as well as from different strata of individual pits. During the discussion Mr. Smith pointed out the lack of common specifications among sand producers and expressed the opinion that such a development would be beneficial to both foundries and producers.

Mr. Akin gave a comprehensive description of a process of sand control, its advantages and proper application. Moisture was given as the most important test recommended for sand, with permeability ranked second. The speaker also listed various casting defects attributable to faulty sand use.

Amendment for Gray Iron Is Approved

National Industrial Recovery board has approved an amendment to the code of fair competition for the gray iron industry incorporating standard clauses suggested by the NRA with respect to filing with a confidential and disinterested agent of the code authority, of identified lists of prices, discounts, rebates and other terms and conditions of sale, known as *price terms*. Authorization is given for such filings when 75 per cent of the tonnage of members of any agency or territorial division form a group in accordance with terms of the code.

The amendment futher stipulates that whenever any member of the group has filed a revision of price terms, that member shall not file a higher price within 48 hours. A further amendment incorporates the NRA's standard clauses regarding willful destructive price cutting, which is declared an unfair method of competition and is forbidden.

Emergency conditions under which the stated minimum price for a specified product for a limited period may be permitted are set forth in the amendment. Such emergency conditions require that an investigation of conditions be made by the code authority through an impartial agency, and the promulgation of a stated minimum price is subject to the approval of the National Industrial Recovery board.

Made Sales Agent For Foundry Equipment

Rapp & Hollins, Inc., 7001 North Clark street, Chicago, has been appointed sales agent in northern Indiana, northern Illinois, eastern Iowa and southern Wisconsin, for sand handling equipment, mold conveyors, casting conveyors, and other foundry equipment produced by the Chain Belt Co., Milwaukee.

Talks on Melting

W. R. Bean, vice president, Whiting Corp., Harvey, Ill., addressed the Northern Illinois Foundrymen's association at its October meeting, held at Rockford. His subject was "Melting Practices and Equipment."

Publishes Specification

American Society for Testing Materials, on recommendation of its committee A-1 on steel, has accepted for publication a tentative specification covering alloy-steel castings for valves, flanges and fittings designated (A 157-34 T) and including eight classes of materials, 6 ferritic steels and 2 austenitic steels. Specifications provide that information on high-temperature data to be a matter of agreement between the purchaser and seller until such a time as the committee's studies warrant the addition of an appendix giving data now being developed.

Concentrates Operations

Shepard Niles Crane & Hoist Corp., is concentrating its manufacturing division at Montour Falls, N. Y. The Niles plant at Philadelphia has been closed and the equipment moved to Montour Falls. The Chemung Foundry, Elmira, N. Y., owned by the Shepard Niles company and which produces all its iron castings, now is the only division not located in the Montour Falls.

ADVERTISING PAGES REMOVED

Convention Shows Industry Gain

(*Continued from page* 21)

Cannon Foundry Co., Muskegon, Mich.; James Lansing, Grand Rapids Malleable Iron Co., Grand Rapids, Mich.; Keith Williams, Pratt & Letchworth Co., Buffalo; and Vaughan Reid, City Pattern Works, Detroit.

A resolution was introduced and passed that all past medalists be elected honorary life members of the association. These medalists include: John Howe Hall, Taylor Wharton Iron & Steel Co., High Bridge, N. J.; Enrique Touceda, Malleable Iron Research institute, Albany, N. Y.; E. V. Ronceray, internationally known French foundryman; John Shaw of the Institute of British Foundrymen; Harry A. Schwartz, National Malleable & Steel Castings Co., Cleveland; Ralph S. MacPherran, Allis-Chalmers Mfg. Co., Milwaukee; and H. W. Gillett, Battelle Memorial institute, Columbus, O.

A resolution was introduced and passed that Arnold Lenz, assistant manufacturing manager, Chevrolet Motor Co., Flint, Mich., and 1934 Whiting gold medalist, be elected honorary life member.

A resolution was introduced and passed that Frank J. Lanahan, retiring president, be made honorary life member.

C. H. Hoyt, in reviewing activities of the past few months, took occasion to thank all participants in the Fifth International Foundry congress, including those who presented papers and took part in discussions, as well as the exhibitors in the foundry exposition, for their whole-hearted co-operation. Selection of a city for holding the thirty-ninth annual convention of the association was referred to the board of directors for action at a later date.

Before adjourning the meeting, Mr. Lanahan paid tribute to the faithfulness and enthusiasm of his host of co-workers and friends in the American Foundrymen's association.

At noon Friday, approximately 200 foundrymen journeyed to Bethlehem, Pa., where officials of the Bethlehem Steel Co., conducted them on a tour through the plant. Through time limitations the visit necessarily was curtailed to certain sections of the immense plant which includes the Lehigh, Saucon and Northampton divisions, extending for 3¼ miles along the south bank of the Lehigh river and which covers an area of approximately 820 acres. The itinerary included the coke ovens, No. 3 fabricating shop, open hearth No. 2, structural shipping yards, 42-inch mill and soaking pits, press and hammer forge, blast furnaces, power house, electric furnaces, cold drawn and electric heat treatment department, first floor in No. 4 and No. 6 machine shops, general iron foundry, small mills, billet yard and 35-inch mill. In the iron foundry the visitors had opportunity to observe the interesting methods and equipment employed in producing cast iron tunnel segments.

Investigates Steel Castings

TWO papers dealing with phenomena incidental to the passage of steel from the liquid to the solid state were presented at the steel session on Tuesday under the chairmanship of R. A. Bull, Chicago. The first paper "Controlled Directional Solidification," was presented by George Batty, Steel Castings Development bureau, Philadelphia, and the second "Studies of Solidification and Contraction in Steel Castings—Free and Hindered Contraction of Cast Carbon Steel," by C. W. Briggs and R. A. Gezelius, United States naval research laboratory, Washington.

In referring to the practice of reversing the position of the mold after it is filled with metal, Mr. Batty stated that the basic idea had been patented many years ago by the famous English steel maker Harry Brearly in the production of sound ingots involving a minimum amount of waste metal at the top. Briefly, the method consists in pouring the metal through a gate at the bottom of the mold. The mold then is swung through an arc of 180 degrees which brings the hottest metal and the hottest part of the mold to the top, the logical position to insure maximum feeding effect. The author illustrated the process by several slides and claimed that while the method was not practical in all instances, it can be and has been applied with marked success on many occasions.

In modification of the general idea the down sprue is connected with a horn gate which conducts the first metal into the bottom of the mold. A second gate is connected to the riser or feed head. The mold is supported in an inclined position by a block under the bottom plate. After the mold is filled with metal the relative position of the two ends of the flask is reversed, thus bringing the gated riser to the highest point.

The paper of C. W. Briggs and R. A. Gezelius is the second presented by those authors before the American Foundrymens association on solidification and contraction of steel castings. In this paper the authors present the result of their studies on the free and the hindered contraction of cast carbon steels with varying carbon content. The contraction data are secured on a bar that cools uniformly throughout. The contraction is hindered by suitable springs and the resulting stresses and the amount of contraction correlated. The data are considered as to practical application and from the specific volume studies an approximation is made of the solidifying contraction.

In the ensuing discussion John Howe Hall, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., recalled the work of Howe and Stoughton in a series of studies on directional solidificatiton conducted with stearine many years ago.

Discuss Cause of Pinholes

Papers presented at the steel session Wednesday centered around one of the peculiar problems of steel foundry practice for which, up to the present, no definite solution has been discovered. The problem in its various manifestations turns up at every convention of the association and while many theories have been advanced, no positive solution seems to have been discovered. The entire session and greater part of the discussion presented at the round table meeting which followed the regular session, were devoted to a consideration of that particular phase of porosity usually known as pin holes, that is the small cavities close to the surface of otherwise sound castings.

Four papers were presented on the subject: "Preparation of Steel To Avoid Porosity in Castings," by C. E. Sims, American Steel Foundries, Chicago; "Relation of Molds and Cores To Porosity in Steel Castings," by George Batty, Steel Castings Development bureau, Philadelphia; "Function of the Steel Foundry Foreman in Preventing Porosity," by R. A. Bull, Chicago, and "Mechanics of Porosity in Steel Castings," by R. C. Woodward, George H. Smith, Steel Casting Co., Milwaukee.

C. E. Sims outlined three main sources for porosity, condition of the metal, of the mold material and construction of the mold. His paper covered only the metal feature. Gases in molten steel are carbon monoxide and carbon dioxide, present only as reaction products; hydrogen and nitrogen soluble as hydride and nitride. He explained the role played by equilibria and surface tension. In his opinion the porosity problem resolves itself into reducing dissolved gases as much as possible, and producing the conditions most favorable for retaining in solid solution those

gases which cannot be eliminated. These conditions may be secured by a long vigorous boil and thorough deoxidation.

George Batty pointed out that the defect may be traced to the sand or in certain instances the binders. He also stressed the necessity of providing free egress of the steam and gas from the sand. In this connection he instanced the efficacy of providing a squeeze board on squeezer type molding machines, provided with nails to artificially vent the upper layer of sand in the cope or drag. He also advocated vented flasks and bottom boards and touched upon the necessity of providing clean gates. In the ensuing discussion he elaborated on the theory that displaced particles of sand are responsible for that particular type of porosity.

Lists Possible Causes

R. A. Bull's paper was confined to the practical phases of the problem. The author directed attention to conditions arising in the transfer from the furnace to the mold. He commented briefly on the use and effects of aluminum. In a practical and comprehensive manner he listed 25 possible causes of porosity, which to some extent, are controllable. He concluded by referring to the interrelationship of possible causes for porosity and the delicate balance necessary to prevent that form of defect.

An interesting theory was advanced by R. C. Woodward to account for porosity close to the surface of steel castings. He presented a study of rejection records over a period of 6 years. Microscopic examination of these castings revealed a relationship between nonmetallic inclusions near the surface and the amount of porosity. Records also showed that porosity was greater in summer than in winter. He concluded that the surface inclusions remain liquid longer than the enclosing envelope and the evolved gas is trapped and held near the skin.

At the round table meeting which followed, reports of committees dealing with proposed classifications of steel castings were submitted by C. H. Lorig, Battelle Memorial institute, Columbus, O., and W. C. Hamilton, American Steel Foundries, Chicago. R. A. Bull reported for the committee investigation the subject of phosphorus and sulphur in steel.

Exchange papers of the Czechoslovakian foundry association and the Institute of British Foundrymen were delivered at the steel founding technical session on Thursday. The former, describing some problems of the physical chemistry of steelmaking, was prepared by P. Herasymenko and E. Valenta of the Skoda Works research institute, Pilsen, Czechoslovakia, and was presented by C. E. Sims.

In the paper the authors discussed the amount of oxide inclusions which may be expected in steel made in the acid open-hearth and basic electric furnaces, respectively. From equilibrium equations and reaction rate constants the amounts of different oxides present can be calculated and tables showing these calculated values checked closely with experimental results. Equilibrium conditions between the different constituents of the steel and also between the steel and slag were considered.

One section of their investigation was devoted to the evolution of gas in molten steel. The theory advanced was as follows: When liquid steel is taken out of the furnace in a ladle, it usually contains only a small excess of iron oxide over that which will be in equilibrium with the carbon content of the metal, so that the reaction rate is low. However, the rapid cooling of the metal brings about the displacement of the oxidation-reduction equilibria for manganese and silicon. These equilibria depend to a great extent on the temperature and therefore the cooling of the metal is accompanied by the separation of silicate inclusions. The composition and the properties of these inclusions will vary with the content of manganese and of silicon in the metal. The iron oxide extracted by silicate inclusions, being now in a more concentrated form, can react with carbon in the metal.

The paper presented numerous interesting explanations involving gas evolutions, deoxidation and nonmetallic inclusions. In the opinion of those present, careful study of the material was seen as having a definite, practical value to steel foundrymen.

Chairman John Howe Hall, introduced H. Spence Thomas, vice president, British Iron and Steel Institute, who presented the British exchange paper on the subject of steel castings, which was written by W. H. Hatfield, director, Brown-Firth Research Laboratories, Sheffield, England. The paper portrayed an interesting picture of steel casting work in England, pointing to the great diversity of designs and the large number of so-called "oddment" orders encountered in steel foundry practice there.

Explains Feeding Heads

Outlining the need for increased research in steel castings, he referred to the problem as yet unsolved of the apparent fact that fluidity at times appears to be influenced by the physical chemistry of steelmaking and to be, in a measure, independent of the actual temperature. Casting conditions and the use of feeder heads was commented upon, and several examples given of the proper application of feeder heads to produce sound castings even where the variation in the section is considerable.

The latter portion of the paper was devoted to a description of the investigation of a turbine casing casting of mild steel. Molding and coremaking practice, location of feeder heads, heat treating procedure and method of examination by sectioning to determine soundness were detailed.

R. A. Bull paid tribute to Dr. Hatfield's paper, remarking that it contained many good suggestions for American foundrymen. He went into the matter of design, stating that designers always ask much of the foundryman, and too often the latter tries to cast a complicated design without attempting to simplify it to make the job easier.

Asking for critical comments rather than laudatory remarks for the author of the paper, F. A. Melmoth, Detroit Steel Casting Co., Detroit, cited what he termed a few misconceptions which Dr. Hatfield apparently had regarding American foundry practice, chief of which was that in this country the main job of foundrymen is to produce large numbers of the same type of casting

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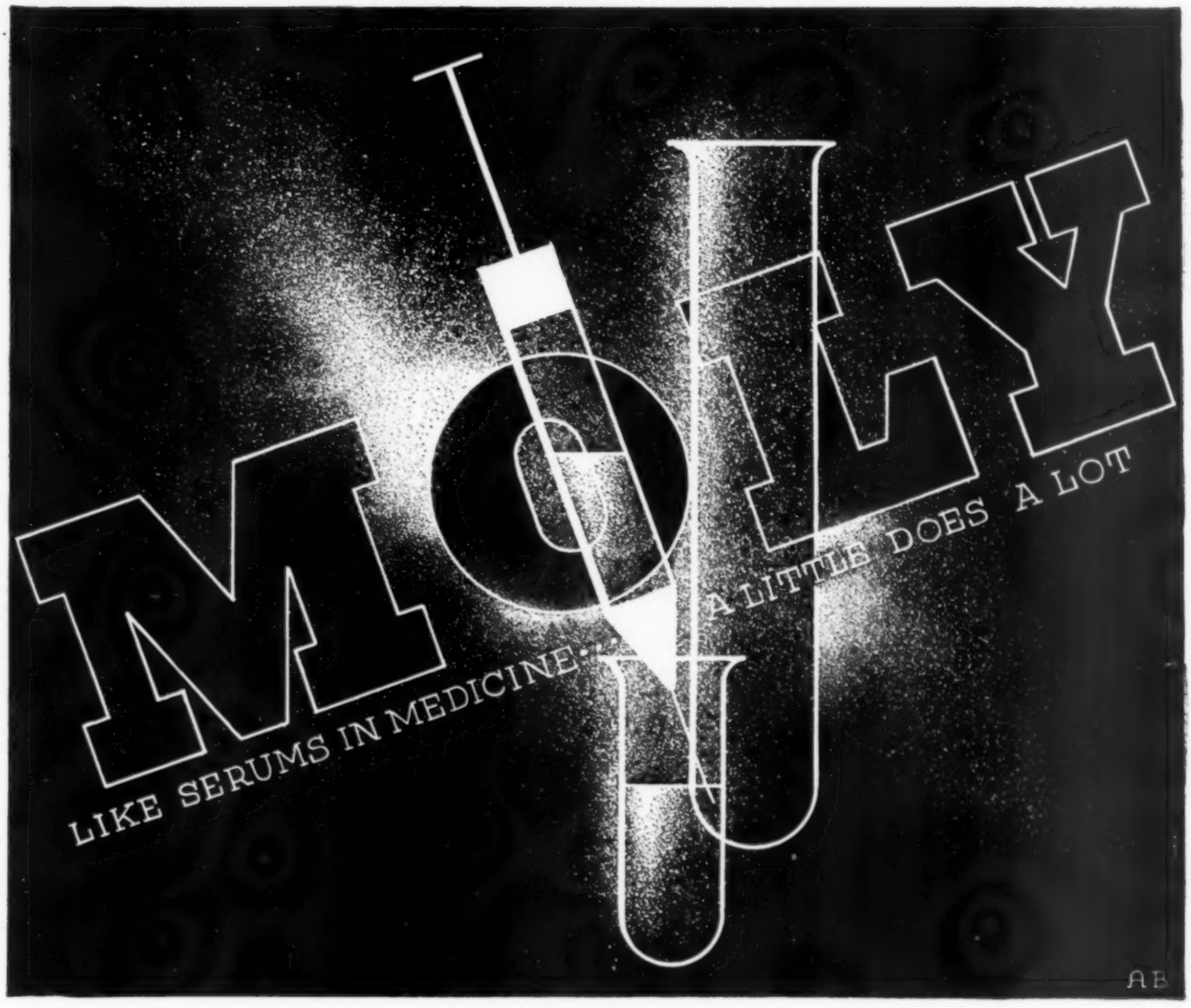
French and English delegations on their way to the United States to attend the Fifth International Foundry congress



NOT only does a small addition of Molybdenum increase the strength and toughness of irons and steels, but it also builds up a stronger resistance to metal "diseases." . . . Corrosion, for instance:

For many years, a maker of large steam turbines had been using steel containing 12/15% Chromium for several of the turbine parts requiring superior corrosion-resistance. One difficulty encountered in this steel was its tendency at times to show a "wormy" finish on the forgings after pickling.

The addition of .50% Molybdenum has completely eliminated this trouble, saving the user far more than the additional cost of the "Moly" required. Furthermore, the Molybdenum serves to remove the tendency toward temper embrittlement that is occasionally encountered in this type of steel.

Molybdenum is a versatile alloy. It actually intensifies the desirable characteristics of other alloys. It contributes greater tensile and creep strength, wear-resistance; makes machining and welding easier. In fact, new analyses — combinations of "Moly" and other alloys — are constantly leading to further developments . . . which is one of the reasons for our having begun the publication of a house-organ, "*The Moly Matrix.*" It aims to help executives and engineers keep up to date with the progress of this extraordinary element. A request puts you on our mailing-list. An added request brings you either or both of these new books: "*Molybdenum in* 1934" and "*Molybdenum in Cast Iron* — 1934 *Supplement*"; while the Climax metallurgists and experimental laboratories in Detroit offer willing assistance toward the solution of your alloy problems. Climax Molybdenum Company, 295 Madison Ave., New York.

CLIMAX Mo-lyb-den-um

(*Continued from page* 48)

and not to be so much concerned over the matter of diversity of production. Mr. Melmoth stated that he thought a greater diversity of castings was produced by American foundrymen than was produced anywhere in the world.

In support of this view, P. E. McKinney, Bethlehem Steel Co., Bethlehem, Pa., showed slides of a recent casting made by Bethlehem, a 230-ton hydraulic press platen which required metal from six open-hearth heats and was poured from four ladles simultaneously. Mr. McKinney also brought up the matter of welding castings, either to salvage them or for general assembly purposes.

E. H. Ballard, General Electric Co., Lynn, Mass., discussed the use of chills on steel castings and declared that the metal used in an internal chill must approach the composition of the casting, since it may melt and run into the casting before solidification. He stated that welding rod composition also should be similar to that of the casting. This view was sanctioned by George Batty.

To avoid the laborious operation of sectioning a casting at various locations to make sure of soundness, C. W. Briggs pointed out how successful use can be made of x-ray and gamma-ray methods.

Probes Malleable Iron Problems

SEVERAL problems connected with the metallurgy and testing of malleable cast iron were discussed Thursday morning with James H. Lansing, Grand Rapids Malleable Works, Grand Rapids, Mich., chairman and R. J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich., vice chairman. A paper "A Note on the Metallography of Ferrite in Malleable Cast Iron," by H. A. Schwartz and C. H. Junge, National Malleable & Steel Castings Co., Cleveland, was presented by Mr. Schwartz.

An investigation conducted by the authors has shown that an etching solution of hot concentrated alkaline sodium picrate produces a pattern in completely graphitized malleable iron which differs from that produced in an acid etch only in sharpness, but that it differentiates between those areas that originally were cementite and those which were austenite. Silicon probably is responsible for that differentiation. Temper carbon modules form preferentially on the austenite-cementite intersurfaces. By use of the etch pattern it is possible to show that the ferrite and temper carbon structure is related to the original hard iron pattern.

A paper "Effect of Copper in Malleable Iron" by C. H. Lorig, Battelle Memorial institute, Columbus, O., and C. S. Smith, American Brass Co., Waterbury, Conn., record a series of tests in which it was found that copper-bearing malleable iron has certain advantages over ordinary unalloyed malleable cast iron. The authors have found that copper is easily soluble, either with the charge or in the ladle, and that at least 3 per cent goes into solution. Under 0.50 per cent, copper has little effect on the physical properties, but from 0.70 to 1.50 per cent improved the strength.

Mechanical properties of iron containing more than 0.70 per cent copper are improved by precipitation hardening, according to the authors. Copper does not change the fluidity or shrinkage of malleable iron, nor does it increase cracking. It has no marked influence on the structure. Copper accelerates graphitization considerably, both in the first and second stages, and reduces the susceptibility to intergranular embrittlement.

Surface Defect Responsible

Enrique Touceda, Malleable Iron Research institute, Albany, N. Y., in a paper on "Cause of the Incompatibility Occasionally Found Between Elongation and Tensile Strength of Malleable Iron Test Bars," stated that the incompatibility always is accompanied by a small, characteristic surface defect on the rim of the fracture. No other defect was found in the test that would account for the abnormally low elongation, and bars which were chemically or structurally defective were affected in all the tensile values. Mr. Touceda believes that defect is caused by a layer of fine dirt from the sea coal facing. In his opinion the malleable industry should not be concerned about that incompatibility.

W. R. Bean, Whiting Corp., Harvey, Ill., presented the report of the committee on nomenclature. That committee recommends the following definition for a group of special irons

(*Continued on page* 52)

Dan M. Avey Made President of A. F. A.

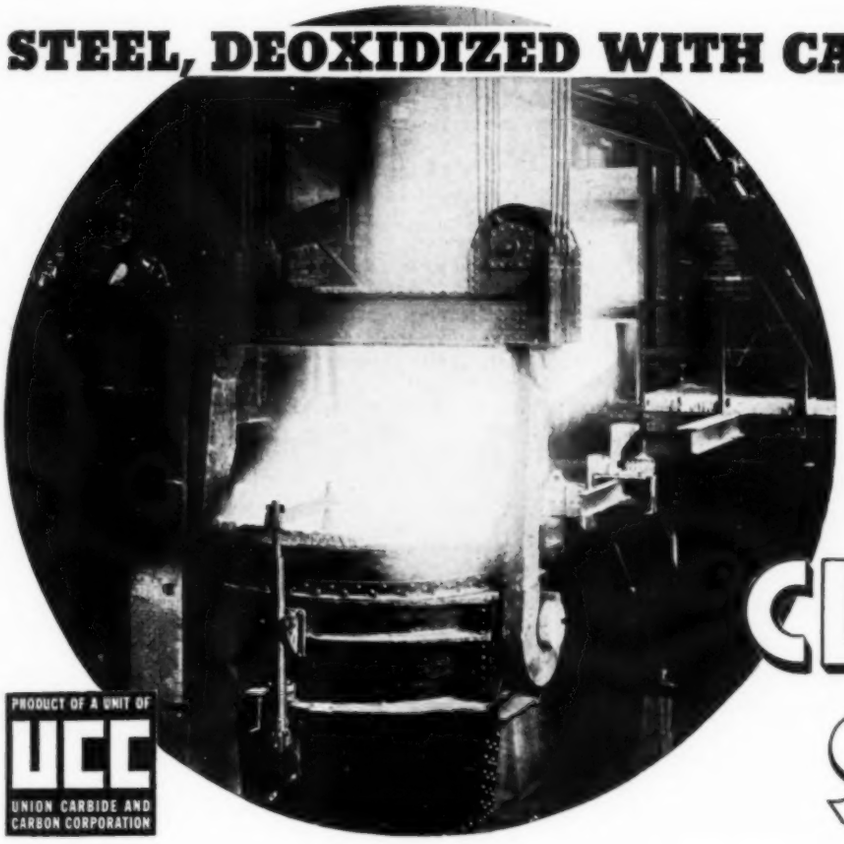
DAN M. AVEY, recently elected president of the American Foundrymen's association was born in Charleston, Ill., on May 3, 1888. He was educated in the public schools and high school, Mattoon, Ill., and was graduated with a degree of bachelor of science in civil engineering from the University of Illinois, Urbana, Ill., in 1910. Previous to entering the university, he was employed as rodman and transitman with the D. S. & M. Transit Co., and Big Four railway maintenance of way department. Later he was assistant city engineer, Mattoon, Ill. In 1910 he became associate editor, Municipal Engineering, Indianapolis, and a year later resigned to become connected with the Engineering Experiment station, University of Illinois, as assistant to the director, where he had charge of publications. From 1912 to 1917 he was assistant cashier, Central Illinois Trust & Savings bank, Mattoon.

In 1917 he first became connected with the Penton Publishing Co., Cleveland, as associate editor of Iron Trade Review, now Steel. Later he was given certain editorial duties in connection with THE FOUNDRY, *and in 1919 he was made managing editor of this publication. In 1926 he was made editor of* THE FOUNDRY, *the position he now holds. He also is a director of the Penton company.*

Harris & Ewing

Mr. Avey has been active in furthering the interests of the various organizations affiliated with the foundry industry. He is a member of the American Foundrymen's association, the American Society for Testing Materials, the Institute of British Foundrymen, the Association Technique de Fonderie de France, and the International Association of Testing Materials. He has served two years as director and member of the executive committee of the American Foundrymen's association, is chairman of the international relations committee, and a member of several other committees.

STEEL, DEOXIDIZED WITH CALCIUM-SILICON



PRODUCT OF A UNIT OF
UCC
UNION CARBIDE AND CARBON CORPORATION

is

CLEANER STEEL

Calcium-Silicon when used as a final deoxidizer leaves steel more free from inclusions. Both elements of this alloy are active deoxidizers. Their effect is rapid and positive. The slag that is formed has low specific gravity and rapidly frees itself from the molten steel. The result is a cleaner, free-flowing steel.

Information on the correct use of Calcium-Silicon in the manufacture of steel is readily available from Electromet.

CHROMIUM
High Carbon Ferrochrome (maximum 6% carbon)
Low-Carbon Ferrochrome (in grades, maximum 0.06% to maximum 2.00% carbon)
Chromium Metal
Chromium-Copper
Miscellaneous Chromium Alloys

SILICON
Ferrosilicon 15% Ferrosilicon 50%
Ferrosilicon 75%
Ferrosilicon 80 to 85%
Ferrosilicon 90 to 95%
Refined Silicon
(minimum 97% Silicon)
Calcium-Silicon
Calcium-Aluminum-Silicon
Calcium-Manganese-Silicon
Silicon-Copper
Miscellaneous Silicon Alloys

BRIQUETS
(Patented)
Chrome Briquets Silicon Briquets
Manganese Briquets

TUNGSTEN

MANGANESE
Standard Ferromanganese
78 to 82%
Low-Carbon Ferromanganese
Medium-Carbon Ferromanganese
Manganese Metal
Manganese-Copper
Miscellaneous Manganese Alloys

SILICO-MANGANESE
All grades including Silico-Spiegel

VANADIUM
All Grades

ZIRCONIUM
Aluminum-Zirconium
35 to 40% Zirconium
12 to 15% Zirconium
Zirconium-Manganese-Silicon

Electromet
Ferro-Alloys & Metals

ELECTRO METALLURGICAL SALES CORP.
Unit of Union Carbide and Carbon Corporation
UCC
CARBIDE and CARBON BUILDING,
30 EAST 42nd STREET, NEW YORK, N. Y.

NRA CODE

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made in the air furnace. "A ferrous metal consisting of a white iron base, heat treated to produce a metal which in its final form contains temper carbon and combined carbon." The committee also recommends that the name *agraphitic* be given these irons.

Following the malleable cast iron session a round table luncheon was held with an excellent attendance. The opening topic of discussion was a continuance of that involving a suitable name for special cast irons made from a white iron base. E. E. Griest, Chicago Railway Equipment Co., Chicago, and chairman of the session, recognized R. J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich., who suggested a number designation such as employed in the American Society for Testing Materials standards for malleable cast iron. In those the first three numbers indicate the minimum yield point in hundreds of pounds per square inch while the last two numbers indicate the minimum elongation in per cent in two inches.

Duncan Forbes, Gunite Foundries Corp., Rockford, Ill., declared in favor of the term "temper-carbon steel" which was previously suggested, and stated that as far as he could see, the special irons referred to differed only from steel in presence of temper carbon in the matrix, which should be considered as contamination similar to silicon, sulphur, etc.

After that discussion, E. E. Griest spoke on the malleable industry code, and requested information on experiences of others with the code.

Discusses Nonferrous Founding

THE first session on nonferrous founding was held Tuesday afternoon under the chairmanship of Sam Tour, Lucius Pitkin Inc., New York. Jerome Strauss Vanadium Corp. of America, Bridgeville, Pa., briefly presented a paper on elevated temperature effects on strength and dimensions of certain aluminum alloys used in aircraft, prepared by R. R. Kennedy, Wright Field, Dayton, O. A written discussion of the paper by W. L. Kempf and R. L. Hopkins, Aluminum Co. of America, New Kensington, Pa., was abstracted by H. J. Rowe, also of that firm.

In introducing the paper prepared by the late A. W. Lorenz, Bucyrus-Erie Co., Milwaukee, the chairman called upon Knight Charlton, one of his associates, for a few words upon his activities, and then requested those present to stand silent for two minutes in memory of Mr. Lorenz. Mr. Charlton also gave an abstract of the paper which was on the porosity in leaded bronze bushings. H. J. Roast, Canadian Bronze Co., Montreal, began discussion of the paper, and stated that the author of the paper was to be commended on his systematic investigation. Sam Tour also pointed out the necessity of careful procedure.

E. G. Eggleston, Detroit Lubricator Co., Detroit, advised that oily borings in an indirect arc electric furnace caused porosity in bronze, and clean material must be used. Another member stated that finely ground carbon did not give the same result as oil, and attributed the trouble to breaking down of hydrocarbons forming oil, producing hydrogen. H. J. Roast said that lead silicate which aggravates porosity is formed more rapidly in the presence of carbon, and attention was called to the need for adequate risers and feeders to eliminate internal shrinkage. During the discussion T. C. Watts, Falcon Bronze Co., Youngstown, O., moved to turn over to the proper nonferrous committee, the problem of standard methods for investigating foundry defects. It was seconded by H. J. Roast, and passed unanimously.

The final paper by W. C. Alvin, Imperial Brass Mfg. Co., Chicago, on melting red brass in the cupola, was abstracted by R. W. Binney, Binney Castings Co., Toledo, O. In discussing the paper T. C. Watts pointed out that the cupola was not suitable for all kinds of brass, particularly those of high zinc content.

Brass Melted in Cupola

A. C. Arbogast, Northern Indiana Brass Co., Elkhart, Ind., requested data on melting 85-5-5-5 alloy in the cupola with reference to silica reduction, metal loss, and cost per ton of metal melted. E. F. Hess, Ohio Injector Co., Wadsworth, O., stated that the 85-5-5-5 alloy could be melted satisfactorily in the cupola, but that a temperature higher than about 2200 degrees Fahr. could not be obtained. Tensile strength of cupola melted brass was about the same as melted in other furnaces. Maurice Greenburg, M. A. Greenburg Co., San Francisco, said that in melting the 88-10-2 alloy for pouring into large pelton water wheel runners, the metal loss in the cupola was about 5 per cent.

The business session of the nonferrous division was held following the last paper, and Mr. Tour announced that the nominating committee recommended Jerome Strauss and John W. Bolton, Lunkenheimer Co., Cincinnati, as chairman and vice chairman

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B. H. Johnson is New Vice President of A.F.A.

B. H. JOHNSON, assistant to the president, R. D. Wood & Co., Philadelphia, recently was elected vice president of the American Foundrymen's association for the year 1933-34. *Mr. Johnson's interests lie mainly in the field of gray iron, and he is a member of several committees in this division. In addition to his committee work, he has been a director of the A.F.A. He is also the representative of the Gray Iron institute on the joint committee on foundry education in engineering schools.*

Mr. Johnson was born in Lynn, Mass., where he received his early education. His technical training was acquired at the Massachusetts Institute of Technology, Cambridge, Mass. After graduation, he became associated with Taylor & Gooding, engineers and machinists at Lynn. When that firm consolidated with the John T. Robinson Co., Hyde Park, Boston, Mr. Johnson accepted the position of superintendent. In 1910, *he became connected with the Cresson-Morris Co. of Philadelphia as works manager, and remained associated with that company for a period of over* 15 *years.*

—*Bachrach*

Mr. Johnson was one of the organizers of the Gray Iron institute and has been active in the work of that association, serving as president for one year. He is also an active member of the Philadelphia Foundrymen's association and the Metal Manufacturers' Association of Philadelphia.

ADVERTISING PAGES REMOVED

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respectively for the next 2 years. C. M. Saeger Jr., bureau of standards, Washington, E. H. Dix, Aluminum Co. of America, New Kensington, Pa., and William Romanoff, Kramer & Co., Chicago, were nominated as members of the advisory committee to serve 4 years. E. F. Hess moved the various officers be elected, and upon a second of the motion they were elected unanimously.

R. L. Binney spoke on next year's program on nonferrous founding, stating that the symposium on deoxidation and degasification would be continued. He requested co-operation of members for discussion subjects, and in obtaining interesting papers for the technical sessions. Mr. Tour stated that the secttion of the handbook devoted to nonferrous founding had been completed, and submitted to the handbook committee.

Control Oxide Formation

A symposium on deoxidation and degasification of nonferrous casting alloys formed the topic of discussion for the second nonferrous founding session held Wednesday morning under the direction of Chairman T. E. Kihlgren, International Nickel Co., Bayonne, N. J., and Vice Chairman C. H. Lorig, Batelle Memorial institute, Columbus, O. The subject was introduced through a paper by Mr. Lorig outlining necessity for deoxidation and degasification, and citing the effects of gases, moisture, nonmetallic elements, hydrogen, furnace atmosphere, etc., on molten metal. O. W. Ellis, Ontario Research Foundation, Toronto, in discussing the paper called attention to the fact that data on effect of hydrogen and oxygen on copper would not necessarily be the same as on copper base alloys. He then read a committee report on the effect of such elements as carbon, sulphur, zinc, tin, etc., on copper alloys, and said that oxide in the metal and hydrogen combined to form steam during melting. The report stated that formation of oxides can be controlled by careful furnace regulation.

L. W. Thelin, Chase Brass & Copper Co., Waterbury, Conn., presented a paper giving data on use of charcoal in nonferrous melting, and stated that with the 85-5-5-5 alloy a charcoal covering decreased defective castings and leakers. He also mentioned that charcoal should not be placed on the bottom of a ladle and the molten metal poured over it as that practice gassed the metal. L. J. Wise, International Nickel Co., New York, said that charcoal may contain hydrogen, moisture, etc., which would cause trouble, and it was advisable to add it early so that those deleterious substances may be driven off by heat.

Yellow brass casting alloys was the subject of a paper presented by L. Ward, Chase Brass & Copper Co., Waterbury, Conn., which outlined factors to be considered in deoxidation and degasification. He said that due to the high zinc content, he did not believe that other deoxidizers were necessary, and that by careful melting practice, attention to skimming, and by pouring at the lowest practical temperature, no trouble was encountered. Sam Tour in discussing the paper stated that in his opinion the time factor played an important part in gas absorption, and through fast melting and removing the metal from the furnace without delay less difficulty would occur from gases.

The meeting ended with the presentation of a paper by H. J. Rowe, on degasification and deoxidation of aluminum and its alloys. Due to the difficulty of reducing aluminum oxide, he pointed out, different methods had to be pursued for deoxidation and degasification. Careful attention to melting practice and pouring procedure, with observance of correct pouring temperature, according to Mr. Rowe, will eliminate most of the troubles due to oxidation and gases.

Excellent attendance at the nonferrous roundtable luncheon held on Wednesday was an indication of the interest in the discussion of problem castings which followed the luncheon. Some five or six castings were passed around to those present for opinions on causes and remedies of the defects. In general the castings seemed to suffer from improper gating and risering, and it was believed that attention to those details would eliminate the trouble. In a few cases the defects were considered due to gas absorption. It was advised that the metal be melted fast and care be exercised to see that a smoky flame was not used. Attention was called to the use of poor quality materials, particularly miscellaneous scrap and oily borings. Poor materials cannot result in quality castings. If miscellaneous materials must be used, they should be melted, cast into ingots, and analyses made to determine the ingot composition.

Mention was made of the possibility of pyrometers being inaccurate, and that they should be checked regularly by comparison with one kept especially for that purpose alone, or through checking by heating to definite temperatures. One method used is to immerse the heat end in molten sodium chloride (common salt). In that material the temperature remains constant at 1472 degrees Fahr. Another method is to place fine pure gold wire between the two ends of an open-end type couple, and heat it up until the gold wire melts. Pure gold melts at 1063 degrees Cent. or 1945 degrees Fahr.

Cast Iron Problems Considered

THREE exchange papers—Spanish, German and Belgian—featured the technical session on cast iron founding held Wednesday, with James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala., as chairman. The first of these papers dealt with working strength and physical properties of gray iron and was prepared and delivered by J. Novarro-Alacer, Valencia, Spain. His comments dealt primarily with the relation of tensile and compression strengths in different diameter test bars to transverse strength. Bars ranged in diameter from 20 to 50 millimeters. His results seemed to advocate the more extensive use of the transverse test for strength comparisons.

"Certainty of Results as the Basis in Manufacture of High-Grade Cast Iron," was the title of the German exchange paper, presented by E. Piwowarsky, professor of metallurgical education, University of Aachen, Germany. Mr. Piwowarsky reviewed some of his earlier work with cast iron, in which he determined the influence of silicon, phosphorus, nickel, chromium, molybdenum, aluminum, etc., on the properties of cast iron of different cross-sectional thickness, and of separately cast round bars tested for transverse strength, hardness and carbide content. Test iron was melted in the crucible and electric furnaces. Results of new experiments were described in which the influence of alloying elements on properties of cupola cast iron of increasing section was determined, using hollow box-shaped castings for test pieces.

A new shear test reported to be inexpensive and easily carried out and involving the use of a special punch and die was described. The test is especially suitable for testing the variation in properties within a certain cast section. Iron tested was type known in Germany as migra iron, a superheated iron with fine graphite.

The third exchange paper presented a study of the fluidity of cast iron and constituted a report of the Belgian Research foundation. It was given in abstract form by W. H. Spencer, American Cast Iron Pipe Co., Birmingham, Ala. Results were given on the effects of silicon, manganese and phosphorus on fluidity, using a special type of spiral test piece. Curves were shown for vari-

ous irons, most of them exhibiting two maximum and two minimum points.

High-chromium cast irons for such applications as conveyor chain links in heat treating furnaces, oil burner parts, exhaust manifolds, die casting machine nozzles, lead pots, annealing boxes, etc., were described in a paper by Garnet P. Phillips, metallurgist, Frank Foundries Corp., Moline, Ill. He outlined the manufacture of irons containing from about 20 to 35 per cent chromium, made in the electric furnace. The irons are divided into two classes, one containing about 1 per cent carbon or less, the other over 1 per cent. Ferrochrome containing 0.7 to 0.8 per cent nitrogen was used to produce fine grain with good physical properties.

Discussion of Mr. Phillips' paper developed the need for a revised nomenclature to include these irons which, according to some observers, are not actually irons at all, but more nearly steels from the standpoint of carbon content, despite the fact that silicon content is higher than in steel.

Describes Permanent Molds

Features of permanent mold castings were elaborated upon by Fred J. Walls, Eaton-Erb Foundry Co., Detroit, who pointed out that one of the first applications of that type of casting was for carburetors, to avoid penetration by gasoline.

He showed lantern slides of a 12-head air-operated permanent mold casting machine, using 14,000 cubic feet of air per minute for cooling, and a special three-head machine with a permanent core, for heavier castings. Molds of the permanent type show a life of from 4000 to 300,000 pieces.

One of the problems involved in that type of casting is how to get the desired high strength with the high total carbon content. An example was given of the advantages of heat treatment. In one case quenching and drawing of a permanent mold casting gave a 40 per cent increase in strength. The castings exhibit hardness of from 40 to 50 brinell higher than sand castings in the annealed condition. Applications include wheels, sprockets, bars, valves, guides, domestic irons and certain parts which must have a finish capable of taking a good plating.

The annual exchange paper of the French foundry association "Cupola High Test Cast Iron" by R. P. Lemoine, was presented in abstract by R. S. MacPherran, Allis-Chalmers Mfg. Co., Milwaukee at the Thursday session on cast iron, presided over by B. H. Johnson, R. D. Wood & Co., Philadelphia. Recent developments in France in the production of high test cast iron have been along two lines. The first is the production of low carbon pig iron from steel scrap in which the metal is treated with soda ash, which acts as a scavenger rather than as a desulphurizer. The sceond is the special action of certain final additions to promote graphitization. The paper presents detailed instruction for the manufacture of this special pig iron.

Three other papers were presented at that session: "Investigation of the Composition of Common Cast Iron Boilers" by G. Sirovich, Rome and G. Vanzetti, Milan, Italy; "Heat Treated Gray Iron Cylinder Liners" by W. Paul Eddy Jr., General Motors Truck Corp., Pontiac, Mich.; "Selection of a Suitable Method of Polishing Cast Iron for Microscopic Examination" by M. F. Surls, Michigan State college, East Lansing, Mich. The first of the three is the annual exchange paper presented on behalf of the Italian Foundry association and was read in English by Mr. Vanzetti.

The problem was to produce satisfactory castings from low carbon, high phosphorus, low silicon pig iron, the only variety available in Italy at moderate price. It was found that the influence of phosphorus depends on the concentration of the other elements. The results of experiment indicated that this type of iron not only is cheap, but that it is superior in physical properties to a low phosphorus iron.

According to the author of the second paper an extended series of experiments led to the adoption of an iron containing 2 per cent nickel, 0.65 per cent chromium for cylinder liners. The castings are hardened by oil quenching from 1550 degrees Fahr. and are tempered at 350 degrees Fahr., for 2 hours. This treatment produces a hardness of approximately rockwell C50 or Vickers brinell 530, and a tensile strength of approximately 38,000 pounds per square inch. The remainder of the paper covered machining, heat treating and assembling operations.

In his paper on polishing specimens Mr. Surls explained the development of a polishing procedure for cast iron and outlined the principles underlying the present methods. A table showed 11 methods now used. Results of his investigation showed that regardless of the method employed, final success depends largely on the skill and experience of the operator.

Recent developments in melting gray iron, particularly in the production of iron for special requirements were discussed at the Thursday noon round table meeting under the chairmanship of E. R. Young, Climax Molybdenum Co., Chicago. In opening the discussion W. R. Bean, Whiting Corp., Chicago referred briefly to the fact that special iron for rolls had been made in England as far back as 1823. In this country high strength irons have been made for over 100 years at the plant of the McIntosh-Hemphill Co., Pittsburgh and for over 70 years in the plant now operated by the Hunt-Spiller Co., Boston. These irons are made in the air furnace. High test iron is a low carbon iron particularly suitable for certain classes of castings.

He stated that for large amounts the cupola always has been the most economical melting medium, but for comparatively small amounts of special iron the rotary furnace operating on pulverized coal is economical and efficient. Touching on the hot blast type of cupola, he stated that the best results are obtained on long heats in better metal and economy of operation. He instanced one installation of a 74-inch cupola melting 180 tons per day working with an 8-ounce blast. The metal is melted in the cupola and flows in a constant stream into a pulverized coal fired air furnace where it is treated and superheated. The carbon is reduced from 25 to 30 points.

In a 5-ton rotary type of furnace fired with pulverized coal and producing white iron for malleable, six heats are made a day with 370 pounds of coal per ton of iron. This iron is tapped at a temperature of 3000 degrees Fahr. The lining cost runs from $1.25 per ton of iron on a brick lining and 86 cents per ton on a special refractory lining. On the first run 300 heats were secured from the lining. The second lining still is in comparatively good shape after 300 heats. Melting loss is approximately 1.00 per cent. The charge is made up of 15 per cent pig iron, 30 per cent malleable scrap and the remainder remelt scrap.

Advantages of Electric Furnace

A. E. Rhoads, Detroit Electric Furnace Co., Detroit, stated that the electric furnace is the ideal medium for superheating metal and for the production of metal in which the operation must be controlled closely. He outlined typical specifications and how to secure metal to meet them. Any extra cost of operation for that method as compared with other processes is offset by the use of cheaper raw materials in many instances.

Don Reese, Whiting Corp., Chicago described a recent installation in which a special low carbon iron is secured by a melting combination made up of a bessemer converter and a cupola. Part of the metal is blown down in the converter and then added to the regular iron in the ladle. The usual proportion is 40 per cent bessemer metal and 60 per cent cupola melted iron.

Although not in a position to furnish a complete theory for the

(*Continued on page* 58)

Reduce defective castings with CHARCOAL IRON

A very good example of the benefits of charcoal iron is revealed by the results of a three months' investigation of defective cylinder blocks. Every defective casting produced during that period was carefully analyzed for cause.

It was found that by using a mix containing 15% charcoal iron instead of all coke pig, small leaks were reduced 47%, cold shuts 86% and mis-runs 91%.

Defective castings are always a problem where the casting is intricate, requires a great deal of machining or where a high degree of strength and pressure tightness is demanded. The resulting improvement in casting quality and the reduction of casting defects makes the use of charcoal iron in such cases the most important economy available.

Ask the Metallurgical Department of the Superior Charcoal Iron Company for suggestions on any special cases under consideration.

SUPERIOR CHARCOAL IRON COMPANY

GRAND RAPIDS, MICHIGAN

DEBEVOISE-ANDERSON CO., INC.

Eastern Representative

NEW YORK **BOSTON** **PHILADELPHIA**

Superior **PURE CHARCOAL PIG IRON**

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phenomenon, Mr. Bean claimed that experience has shown that a softer metal is produced in a hot blast cupola operating on low pressure, than in a cold blast cupola operating on high blast, even though both cupolas are charged with the same materials. He was inclined to the opinion that hydrogen and nitrogen played some part in the process, but up to the present his investigation had not yielded sufficient data for positive conclusions.

Testing cast iron was the subject of a joint session Friday morning participated in by members of the A. F. A. and the American Society for Testing Materials, and was presided over by J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala. R. S. MacPherran, Allis-Chalmers Mfg. Co, Milwaukee, opened the meeting with a paper entitled, "Testing Cast Iron" which described various methods available, and their application in ascertaining desired information on physical properties.

In discussing the paper F. G. Tatnall, Baldwin - Southwark Corp., Philadelphia, mentioned he believed that an impact test which applied a torsion just at the instant of the blow had possibilities for testing cast iron. He stated that the particular test was employed successfully for glass, ceramic materials, etc. Mr. Frank F. Vaughn, Caterpillar Tractor Co., Peoria, Ill., stated that he used one-half of the standard arbitration test bar which was ground on a centerless grinding machine to 1.25-inch in diameter for impact testing and the other for tensile strength determination.

Tests Are Not Related

He said that there was no connection between tensile strength and impact value. Using the same base mixture with different alloying agents, one gave a tensile strength of 57,600 pounds per square inch with an impact value of 80 foot-pounds while the other showed a tensile strength of 52,400 pounds per square inch with an impact of 38.6 foot-pounds. J. T. MacKenzie said that he believed considerable information on the properties of cast iron could be gained from the transverse and impact values. C. M. Saeger Jr., bureau of standards, described some work in making test bars in the vertical position, gated at the bottom, using dry sand molds that were blacked. He said quite uniform results were obtained with the bars.

W. H. Spencer, American Cast Iron Pipe Co., Birmingham, Ala., presented a paper on the chilling properties of cast iron which referred to those irons used for cast pipe. He said that increasing phosphorus content in those irons decreased tendency to chill, and that when the manganese content was about 0.35 per cent greater than the theoretical manganese equal to 1.7 times the sulphur there was little tendency to chill. Increasing sulphur increased the chill, and also led to a sharp demarcation between chill and gray portions in the iron. He also pointed out that it is necessary to determine a constant point for estimation of chill, that is using either the last white or the first gray. Fred J. Walls asked whether any data had been secured on the relation of pouring temperature to chill depth, and Mr. Spencer replied that on hot pouring at 2632 degrees Fahr., a light chill was obtained; with cold pouring at 2200 degrees Fahr., a light chill was obtained, and at a temperature midway between the two, the heaviest chill was obtained.

"Fatigue Tests of High Strength Cast Irons" was the subject of a paper by H. F. Moore, and J. J. Picco, University of Illinois, Urbana, Ill.,, which was presented by Mr Picco. Results obtained indicated that in general the fatigue tests of such irons are approximately proportional to the static tensile strength of the irons. The session was closed with a paper by Garnet Phillips, Frank Foundries Corp., Moline, Ill., on horizontally poured test bars. According to Mr. Phillips, that method of pouring test bars gives more concordant results, and there is less tendency for defective bars.

Stress Apprentice Training Needs

As industry emerges from four years of depression, the need for new concentration upon the problem of training apprentices for skilled labor work becomes serious. This fact was emphasized forcibly as a result of an extensive survey of industries in the Philadelphia district, made by Kenneth Coolbaugh, Pennsylvania department of labor and industry, Philadelphia, and reported upon at a session on apprentice training on Tuesday. E. H. Ballard, General Electric Co., West Lynn, Mass. was chairman of the session and John H. Ploehn, French & Hecht, Inc., Davenport, Ia., vice chairman.

The significant fact developed by this survey appears to be that a distinct shortage of skilled workers in a number of lines is evident — notably molders, machine operators, toolmakers, diesinkers, machinists and the like. When industrial conditions improve, as it seems they are bound to, this shortage will become acute and the logical approach to the impending difficulty lies in immediate institution of carefully designed programs of apprentice training.

The question naturally arises: Where have former skilled workers gone? Why the shortage now? Three factors bear on this question. Many workers have switched to new fields; some have established businesses of their own; others have succumbed to old age and failing health. Reliable estimates indicate that there is a 5 per cent loss in skilled labor yearly from old age-poor health causes. Unless this loss is made up by newly trained men, which of course has not been done in recent years, a shortage is but natural. On top of this, current agitation in Washington is toward a further reduction in working hours, which can only aggravate the situation.

Mr. Coolbaugh pointed out that public employment agencies have lists of thousands of young men, eager to learn a trade, from which employers might select suitable applicants for apprentice training.

Thus, briefly, is the need for apprentice training programs at the moment. Turning to reasons why this type of training has been receiving increasing attention, W. F. Patterson, executive secretary, federal committee on apprentice training, Washington, pointed out three: First, immigration has been shut off, virtually locking out skilled labor from abroad; second, there has been practically a moratorium on apprentice training since 1929; and third, NRA codes, with their minimum wage provisions, have prevented apprentice training, although there are some exceptions to the latter inasmuch as 4.3 per cent of the present codes have reasonable provisions for that work.

The result has been a pressure on the government from many sources to facilitate establishment of plans for apprentice training. To satisfy these demands a permanent organization has been set up under direction of the secretary of labor. That organization involves a committee of three, which is now functioning to set up apprentice training programs in all 48 states, the work in each state to be under the direction of committees of six or eight persons, carefully selected to represent employers, labor, government and educational bureaus. Regional conferences aiming to complete these state committees have been concluded and at present agencies have been established in ten states—Wisconsin, Michigan, Colorado, Wyoming, North Dakota, Ohio, Kentucky, Delaware, Maine and West Virginia.

The underlying effort in the whole program has been to use existing agencies experienced in apprentice training work, but to correlate the whole effort so that it may proceed under unified guidance and with a common purpose. Recommendations so far made are that apprentices must go to school at least 144 hours per year.

(*Concluded on page* 60)

TABOR

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NRA — WE DO OUR PART

1884 50th ANNIVERSARY YEAR 1934

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that they must be under contract to employers, that the training must be at least of 1-year duration and that they must be paid a minimum of 25 per cent of journeymen's wages on a one-year basis and 50 per cent on a more extended basis.

These stipulations are not mandatory and the program is not intended to disturb existing arrangements, it was emphasized by Mr. Patterson. Employers, if they so desire, may follow the code requirements for their industry or they may amend their codes to include the new suggestions. It is hoped that the efforts of the federal committee on apprentice training will result in a real all-around training program.

The problem of apprentice training in small communities with limited school facilities was discussed by John Ploehn who showed how his company had solved the problem by means of correspondence courses, part of the cost of which is paid by the company, and by four hours of local school work each week on the part of the apprentice. Mr. Frank pointed out that it is easy to sell the idea of apprentice training to company executives and to superintendents, but that it is most essential that the idea be sold to the foremen in the small shop, since the foremen usually have charge of assigning apprentices to their work and transferring them. If foremen do not understand how the plan is supposed to work, difficulties are likely to arise, largely on the part of the apprentice who may feel that he is not being treated fairly.

E. H. Ballard pointed out how the interchange of apprentices among companies in small communities has worked advantageously. He discussed the need for trained men today, stating it is greater than ever before. In his opinion, a 15 per cent increase in business over that experienced in 1934 will result in a demand for more skilled ment than will be available at the time.

Maintenance of Shop Equipment

PROBLEMS of maintenance of foundry equipment, involving the equipment manufacturer and the foundryman, provided a topic for an interesting discussion following the presentation of two papers at the session on materials handling on Friday. E. W. Beach, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., presided.

R. J. Heisserman, Link-Belt Co., Philadelphia, presented a paper on "Selecting Foundry Conveying Equipment," which outlines the steps leading up to the selection of a continuous molding and pouring system, and points out that when considering equipment of that type, a survey should be made to determine whether such a system would benefit the prospective purchaser. The paper also contains an outline of an installation, both from the engineers and the purchasers standpoint, and a list of the various types of equipment that are available. The author showed a number of slides to illustrate various types of mold and sand handling installations.

Keep Plant in Condition

Plant maintenance consists of sustaining the plant and its equipment in good operating condition, according to James Thomson, Continental Roll & Steel Foundry Co., East Chicago, Ind., who presented a paper on "Foundry Maintenance." Mr. Thomson stated that the main functions of the maintenance department are to make emergency repairs; inspect equipment at regular intervals; follow the inspection with necessary repairs; keep adequate records of the inspection; suggest need of changes to engineering department; and to operate such service departments as may be assigned to that department.

The paper suggests decreasing breakdowns and necessary emergency repairs by redesigning or improving the machines. Periodic inspection and carefully kept records form the basis for constructive repair work, and frequently also prevent breakdowns. The speaker pointed out that adequate operating and maintenance data should be provided by the equipment manufacturer. He suggested the standardization of material used, since that permits wide interchangeability of equipment and lowers the inventory of spare parts.

William M. Booth, Crouse-Hinds Co., Syracuse, N. Y., in the discussion which followed, described the detailed studies which were made several years ago when the company was considering the installation of a mechanized foundry. He stated that it had been possible to operate the continuous unit during the depression with considerable success and that the application of continuous pouring has been of marked advantage to the company. The firm produced an average of 20 tons a day when the system was installed, but during the depression it was operated on the basis of 10 tons. The company found that it could pour a casting 1 cent a pound cheaper on the conveyor than on the floor, and that the differential remained about the same during the past four years, providing overhead is not considered.

James A. Sweeney, Florence Pipe Foundry Co., Florence, N. J., raised a question as to whether crane operators should be under the maintenance department. Mr. Thomson stated that in his opinion less wear and tear on the crane equipment will be encountered if the crane operators are under the supervision of the maintenance department. A. F. Anjeskey, Cleveland Crane & Engineering Co., Cleveland, brought up the point that it is difficult to get the catalog showing the designation of parts to the engineering department. The idea of buying equipment on price alone was discussed and the difficulties which will follow such a practice were outlined.

Due to the extensive character of the technical program of the Philadelphia convention, and the widespread interest evidenced by the large attendance and splendid discussions, it is not possible to present all of the complete and detailed reports in this issue. Reports on the sand control and gray iron practice shop courses, and sessions on pattern-making and refractories, will be presented in December.

The Editors.

Detroit Group Hears Talk by Boland

John J. Boland, Griffin Wheel Co., Chicago, addressed the members of the Detroit Foundrymen's association on "Development and Operation of a Hot Blast Cupola" at the regular meeting held at the Detroit Leland hotel, Oct. 18. Mr. Boland formerly was superintendent of the Griffin Wheel Co., Detroit, and is a past president of the Detroit Foundrymen's association.

Harry Rayner, Dodge Bros., Detroit, and president of the association announced the appointment of chairmen of the various committees of the group. Applications of four new members were received and approved.

Make Appointments

H. V. Glunz has been appointed general manager of operations and George W. Starr has been made general manager of sales of the Ohio Ferro-Alloys Corp., Canton, O.

Mr. Glunz was graduated from Ohio State university, Columbus, O., 1915 and has had a wide experience in steel industry, embracing particularly the production of quality alloy steels in the open hearth and electric furnace.

Mr. Starr has been identified closely with the iron and steel industry and for a long period was associated with the United Alloy Steel Corp., now a unit of the Republic Steel Corp. and director of purchases.

W. A. Harriman has been made administrative officer of the National Recovery administration, succeeding Col. George A. Lynch who has returned to active duties in the United States army.

Exhibition Reveals Progress

(*Continued from page 27*)

the smaller of the two the screen is heavy wire. In the larger machine the vibrating table is constructed of heavy perforated steel plate.

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y. showed an application of a selective 5-speed push button control for use with any type of crane or hoist. To a certain extent this may be compared to the transmission on an automobile, and represents a notable advance on the types of controllers formerly employed. Yale & Towne Mfg. Co., Philadelphia showed chain blocks, electric chain hoists, trucks and tractors.

Riddles, screens, sand testing machines were shown by Federal Foundry Supply Co., Cleveland. Sand testing machines of various types were displayed and demonstrated by H. W. Dietert Co., Detroit. Aluminum flaks in a variety of sizes and shapes were displayed by Hines Mfg. Co., Cleveland. Matchplate patterns made from a special compound were exhibited by the Stone Pattern Mount Co., Philadelphia.

Display Many Refractories

A wide variety of refractories for application in ferrous and nonferrous melting and heat treating furnaces was displayed by a number of manufacturers. Cleveland Quarries Co., Cleveland, showed its silica firestone refractory in numerous shapes such as blocks and bricks for cupola linings and heat treating furnaces, slag hole and tapping hole blocks, and tiles for acid tank linings. In addition silica sand for malleable iron air furnaces was displayed. Carborundum Co., refractories division, Perth Amboy, N. J. showed its silicon carbide in lump form, the raw material which is the basis of numerous refractory shapes and cements employed in the industry. Included in the exhibit were brick and tile shapes, hearth blocks, recuperators and cements.

Illinois Clay Products Co., Joliet, Ill., showed samples of its fire clays and bonding clays for molding sands, fire brick, cupola blocks, insulating brick and other refractories made from its clays. Electro Refractories & Alloys Corp., Buffalo, displayed various sizes of its crucibles patching cement for furnaces linings, refractories and a number of alloys and degasifying materials in shot form for nonferrous metals.

Graphite crucibles, lids, furnace covers, pit furnace linings, etc. were displayed by the Chicago-Naugatuck Crucible Co., Naugatuck, Conn., and the Vesuvius Crucible Co., Swissvale, Pa. Lava Crucible Co. of Pittsburgh and the Joseph Dixon Crucible Co., Jersey City, N. J., also showed their line of graphite crucibles, refractories, core washes and other graphite products.

An operating exhibit of its cupola air weighing control was shown by the Foxboro Co., Foxboro, Mass., in connection with the Spencer Turbine Co., Hartford, Conn. Pyrometer Instrument Co., New York, displayed several types of the pyrometers it manufactures. Included in the exhibit were a new triple range, self contained, optical type pyrometer with a range from 1400 to 3700 degrees Fahr. for molten iron and steel and black body conditions, single and double range optical pyrometers, radiation type instruments, immersion type and surface type pyrometers. Illinois Testing Laboratories Inc., Chicago, exhibited several types of its pyrometers, indicating meters, and surface temperature instruments. The firm also showed its new type volume meter for measuring the volume of air directly in cubic feet per minute wtih a range from 300 to 3000 cubic feet per minute.

The widening application of alloying agents in the field of ferrous and nonferrous founding was shown in displays by a number of firms making those materials. Climax Molybdenum Co., New York, exhibited an 8-cylinder motor block and a 6-foot diameter gear made from high quality gray iron in which molybdenum was used. In addition that company displayed test specimens taken from steel and gray iron heats, containing molybdenum. Information on the physical properties attained also was available.

Electro Metallurgical Co., New York, had an attractive display of various types of castings containing varying amounts of chromium, and on translucent glass screens presented information on physical properties of irons and steels containing definite ranges of chromium. In addition the firm displayed its ferrosilicon, silico-manganese, and ferrochromium briquets for cupola melting, and lumps of commercially pure chromium, and its nitrogen-ferrochromium.

Metallic nickel in various forms for alloying gray iron and nonferrous metals with a great variety of castings containing nickel drew many to the attractive exhibit of the International Nickel Co., New York. A revolving cylinder containing a map of the United States showing distributors of the firm's alloys, was in the foreground of the exhibition, and the background of the booth gave information on the properties attained through addition of nickel to ferrous and nonferrous metals. Vanadium Corp. of America, New York, displayed specimens of its various ferroalloys, photographs of castings, and micrographs illustrating the structure obtained through use of those alloys.

A wide variety of brass, bronze, aluminum, lead and tin base alloys in ingot form was shown by several firms, who in addition exhibited castings made from those materials. The companies included Ajax Metal Co., Philadelphia; Michigan Smelting & Refining Co., Detroit; Niagara Falls Smelting & Refining Co., Buffalo; Girard Smelting & Refining Co., Philadelphia; R. Lavin & Sons, Chicago; White Bros. Smelting Corp., Philadelphia, and Nassau Smelting & Refining Co. Inc., New York.

Schramm Inc., West Chester, Pa., had two of its vertical compressors supplying compressed air to operating exhibits in the exhibition hall. One with four cylinders carried the loads while a 2-cylinder machine was used as an auxiliary for heavy loads. Whiting Corp., Harvey, Ill., showed a wide variety of its installations of various types of foundry equipment by photographs. The firm also showed its stoker for core and drying ovens, the roller bearing end for its tumbling mills, and its tube type cloth for dust collectors. In addition a moving picture showing old and new types of foundry equipment was displayed.

Many Types of Furnaces

Foundry Equipment Co., Cleveland, showed numerous photographic illustrations of its core and mold ovens, industrial ovens and industrial furnaces that have been installed in various foundries. Spencer Turbine Co., Hartford, Conn., had one of its blowers in operation. It was attached to a cupola made by the Tabor Co., Philadelphia and was equipped with an air control device made by the Foxboro Co.

Detroit Electric Furnace Co., Detroit, had one of its laboratory type indirect arc furnaces in operation to show various characteristics. In addition the firm displayed numerous castings in ferrous and nonferrous metals which were melted in its furnaces installed in various foundries. Campbell-Hausfeld Co., Harrison, O., showed one of its oil or gas fired furnaces to take a No. 60 crucible, and one to take a No. 120 crucible. The smaller furnace was stationary while the large one was the tilting type.

Ajax Electric Furnace Corp., Philadelphia, displayed photographs of installations of its 60-cycle induction furnace for nonferrous melting, and also a section model of the furnace to show its construction. Ajax Electrothermic Corp., Trenton, N. J., had a model working exhibit of its high frequency type melting and heating furnace equipment. Small steel billets ½ x 2 inches were heated, and small quantities of metal were melted in a crucible type equipment.

Sands and clays used in the foundry comprised an important section of the exhibits. Whitehead Bros. Co., New York, showed a wide variety of molding sands, also a number of

types of core sand and special blended steel molding sand for green and dry sand work. Other products included parting compounds, facings and blasting sands. An operating model of a complete sand screening plant was a feature of the exhibit of the New Jersey Silica Sand Co., Millville, N. J. Samples of the company's products also were on display, including molding sand, core sand and silica flour.

Great Lakes Foundry Sand Co., Detroit, displayed samples of a wide variety of sands, clays and other materials for use in core, molding, cleaning and melting departments of foundries. Of interest were borium and hard iron nozzles for cleaning room use. Aluminum tapered slip-flasks and flexible jackets also were shown.

Cement Improves Insulation

In addition to a display of foundry sands, sandblast sand, gravel, foundry facings and blackings, George F. Pettinos Inc., Philadelphia, performed an interesting test designed to show the merits of a new insulating and high-temperature cement with a mineral wool base. Small welded steel boilers were covered with the new cement and an ordinary type of insulating cement and the difference in time required to build up steam with constant heating on both boilers was noted. The new cement, suitable for use on core ovens, annealing furnaces, boilers, open-hearth furnaces and other units, shows a heat transmission of about 0.217 b.t.u. per square foot per hour.

A small electric train hauling loads of sand and clay formed the central feature of the exhibit of Taggart & Co., Philadelphia, manufacturers of foundry sands and bonding clays. Paxson Co., Philadelphia, also showed samples of foundry sands, facings and supplies.

A complete range of cores for such automotive castings as manifolds, cylinder heads, carburetors and the like, and made with core oil produced by Frederic B. Stevens Inc., Detroit, attracted attention at the booth of that company. A number of stamped steel ladle bowls, ranging in capacity from 60 to 250 pounds, also were shown in this exhibit. The bowls were drawn from a special heat-resisting steel.

J. S. McCormick Co., Pittsburgh, arranged its products in an attractive disyplay case and termed it the "Parade of Products." These included core wash, blacking, plumbago, core binders, core compounds, core paste, green sand facings, cleaning room supplies and miscellaneous materials.

Samples of sectioned and fractured ingots and castings treated with a new solid casting compound to take out primary and secondary piping at the top of the ingots were displayed by the S. Obermayer Co., Chicago, in the operating section of the exhibit. A new core mold spray device for blacking cores and molds also was shown.

Samples of a new high-grade brass flux and cleaner were shown by the Cleveland Flux Co., Cleveland, as well as a briquetted iron cupola flux. Asbury Graphite Mills, Asbury, N. J., exhibited a plumbago core wash, blackings and numerous type of crude and refined graphite-flake, crystalline and amorphous. Several types of foundry facings and graphite products also were shown by the Bloomsbury Graphite Co., Bloomsbury, N. J., while the United States Graphite Co., Saginaw, Mich., displayed samples of Mexican graphite, plumbago, blacking core wash and graphite products. Representatives of Hill & Griffith Co., Cincinnati, were present to consult on problems relating to foundry facings, etc.

United Compound Co., Buffalo, operated a booth in conjunction with the Combined Supply & Equipment Co., Buffalo, the former showing spools of vent wax in a variety of sizes. The latter displayed single and double head chaplets and cast aluminum pattern plates.

Cores and castings for various parts used on the new Burlington railroad streamlined train were featured by the Werner G. Smith Co., Cleveland, all the cores shown having been made with core oils produced by that company. Operating models of the Burlington "Zephyr" in miniature attracted attention to this booth. American Gum Products Co., New York, and Robeson Process Co., New York, collaborated in an exhibit of liquid and powder core binders, with samples of cores made with these binders. Core oil, and core and mold washes capable of withstanding temperatures of 6000 degrees Fahr, were shown by the Quandt Chemical Co., San Francisco.

For Safety First

The "largest boot in the world" towered over the exhibit of the Safety First Shoe Co., Holliston, Mass. A size 129, it required 45 square feet of upper leather, 65 pounds of sole leather and weighted 285 pounds. The company also showed a variety of other safety shoes for foundrymen, but for normal size feet. Safety-first kits for use in the foundry were featured by Burroughs-Wellcome & Co. Inc., New York, as well as supplies for first-aid stations.

Dust protective devices for foundry workers were shown by the Standard Safety Equipment Co., Chicago. Among them was a new type of respirator in which the face piece was separate from the filtering bag, the two being connected by a 28-inch corrugated flexible hose. The filtering bag is assembled inside a canister worn at the back of the operator and has a filtering area of 104 square inches. This large area permits the use of a dense and effective felt material in construction of the bag, at the same time showing low breathing resistance. Masks, goggles, gloves, leggings and shoes also were on display.

In one half of the attractive exhibit of Union Carbide & Carbon Corp., the Linde Air Products Co., New York, displayed a new-type cutting machine for straight line and circle cutting and simple flame machining. It was so designed that one or two blow pipes could be operated simultaneously. Supplementing this equipment was a display of pressure regulators, blowpipes, welding rods and other materials for the welding operator.

Interchangeable pins and bushings for pinning and clamping flasks were shown by the Federal Screw Works, Detroit. The bushings are hardened and ground and pressed in cope ears; pins likewise are hardened and ground and pressed in drag ears.

To demonstrate the effectiveness of its belt preservative, the Cling Surface Co., Buffalo, operated two separate drives from motor to generator, one belt treated and the other not treated.

Piwowarsky Talks At Quad City Meeting

One hundred foundrymen attended the regular meeting of the Quad-City Foundrymen's association, held Oct. 15 at the LeClaire hotel, Moline, Ill., with Clyde Burgston, Deere & Co., Moline, president of the association, presiding. Hyman Bornstein presented a brief outline of the proposed plan for affiliating with the A. F. A. as a chapter of that organization. It was announced that the proposal will be voted on at the next meeting.

Dr. E. R. Piwowarsky, professor of metallurgy, University of Aachen, Germany, spoke on "Investigations and Results in Research Work Carried On by the Foundry Institute at Aachen." Dr. Piwowarsky gave an interesting talk on the findings resulting from the study by that organization of high test cast iron. A. R. Clark, Sloss-Sheffield Steel & Iron Co., Chicago, spoke briefly on "Blast Furnace and Pig Iron."

The next meeting of the association will be held at Rock Island, Ill., Nov. 19, and will be devoted to a talk on the "Heat Treatment of Cast Iron."

New Jersey Group Hears Address on NRA

Colonel W. W. Rose, deputy administrator, in charge of foundry codes, addressed the members of the New Jersey Foundrymen's association at the first fall dinner meeting of that group held Nov. 1, at the Hotel Elton, Newark, N. J. Colonel Rose spoke on "Recent Development in the NRA."

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228 N. La Salle St. *Chicago, Illinois*

The three should see a barber

The Adventures of Bill

BY PAT DWYER

MODERN engineers assure us that an open grate fire is the most wasteful and inefficient of the many methods available for heating a room. Probably they are right where the problem is considered merely from the cost standpoint, but this would be a drab and sorry world indeed if every person subscribed to the views of this cold blooded fraternity and worshipped the frigid, acetic god of cost rather than the friendly, benevolent gods of bodily comfort and pleasure.

In recent years the science of heating houses with hot air, hot water and steam has been developed to a high state of perfection. The old kitchen stove where frozen feet may be thawed in the oven has its commendable feature. Happy memories cling around the anthracite base burner and its respected globular first cousin properly stoked with a generous stream of soft coal, but as Bill remarked the other night while sprawled out with his long feet on the fender, "none of 'em has the hospitality, the cheeriness, the—dash it all—the authority of a rousing fire in a grate."

Occasional gusts of wind drove noisy splashes of rain against a side window, the cold, dismal rain of November, probably the most disagreeable month in the entire year. For the thousand and first time I wondered why I had not followed a youthful hunch to leave this country flat on its back and depart for one of the favored lands where the sun shines bravely, the palm trees wave in the breeze and the birds sing gaily every day.

Speculating idly on this interesting subject, association of ideas led me to the opposite extreme and I wondered what possible combination of circumstances, or what mysterious force urges certain men to forsake civilization and to live voluntarily in a land of ice and snow. More for the sake of stirring up conversation than because I was even mildly interested in the subject I asked Bill how he would like to spend a year or two with Byrd at the South Pole.

"Well," said Bill, "I'll tell you. It is rather a coincidence that you should raise that point at this particular time. I was going to show you a clipping from a paper printed a few years ago at the time Byrd made his famous flight over the North Pole. This clipping is a remarkable example of the painstaking accuracy with which current news is prepared for and presented to the public. The trained analytical mind and the piercing photographic eye of the reporter apparently missed nothing. I wish now I had taken the paper with me to the A. F. A. convention in Philadelphia. So far as I know, nothing like it ever has been presented at any of the technical sessions."

"Why should anything like it be presented?" I asked in astonishment. "I never have seen any person presenting a paper on high diving, hog calling, rose culture or the menace of the boll weevil, at any convention I have attended. Therefore, pray tell me why any place on the agenda should be given to a paper dealing with a flight around or over the pole?"

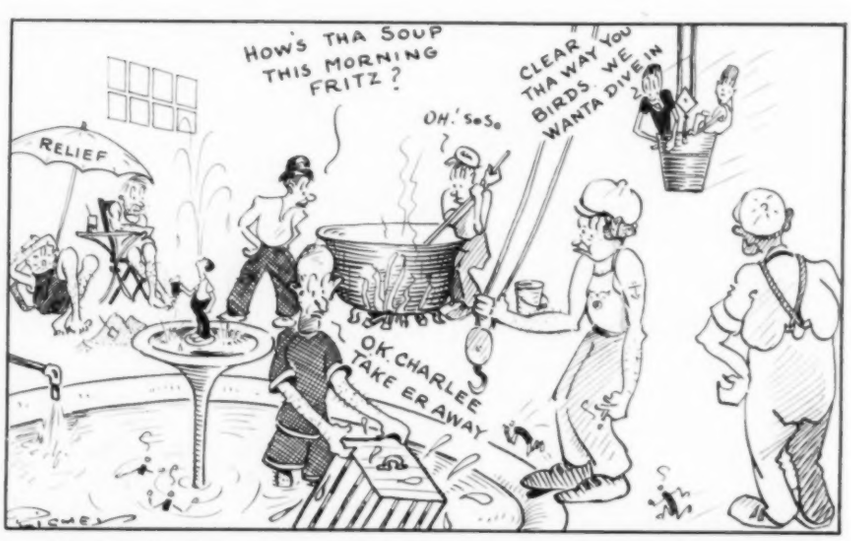
"My dear lad! When are you going to cease jumping to conclusions? I did not say that the clipping was an account of Byrd's flight around the pole. I said it was published at, on or about the time the intrepid explorer was engaged in his hazardous undertaking. As a matter of fact the polar flight is only slightly incidental to the main theme."

"Ah, so there is a theme? What am I supposed to do next? Ask you is it animal, vegetable or mineral and then take three guesses?"

"Calm yourself," said Bill. "Be tranquil. Take an example from your Uncle Willie. I appreciate your burning desire to know all, but remember, indecent haste has spoiled many a good job. If the reporter who wrote the story had taken his time, or if he had come down from his lofty perch and deigned to ask a few questions—well, if he had done these things he would not have turned out such a masterpiece."

"For heaven's sake, stop playing *All around the mulberry bush the monkey chased the weasel* and read the thing, or let me see it. If it is so remarkable, it is a pity you did

(*Concluded on page* 69)



First authentic picture of secret process in an aluminum foundry

ADVERTISING PAGES REMOVED

(*Concluded from page 66*)

not present it before the convention."

"Remarkable is the word," Bill admitted. "This is the true and inside story of how the pistons for Bryd's engines were cast. You will note that the methods differ to a radical extent from those ordinarily employed. That is why I said the paper would have created a sensation had I presented it at one of the technical sessions. I have no doubt several gentlemen would have objected violently to some of the statements. Pioneers in any line must be prepared to meet oppositoin and trust to time for vindication. The unbiased reporter set down calmly and coldly exactly what he saw. The occasional carefully studied lapses in spelling, composition and grammar constitute an additional tribute to the writer's skill. The clipping is headed:

CITY WORKED ON BYRD'S ENGINE

This was followed by the local interest subhead:

Pistons for Pole Flight Came From Here

The beginnings of Lieut. Commander Richard E. Byrd's flight over the north pole was traced to this city yesterday.

In a foundry where huge hammers thunder, each of which has several car loads of cement in its base, and among vats of molten metal swinging overhead, several rows of molds enveloped in flames, were found. In these molds the molten alloy becomes pistons.

Then, after walking several blocks through the sand molding department, where red hot engine blocks move on sliding metal floors, one finds furnaces beside pools of water.

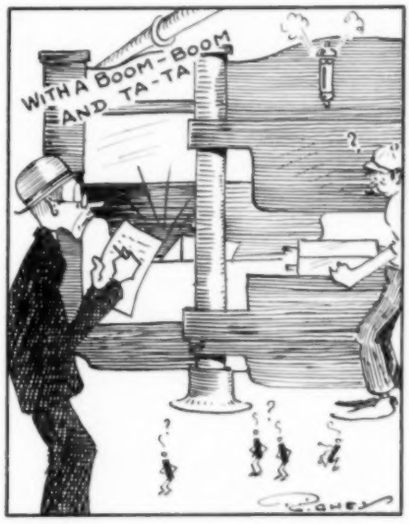
Crates of pistons are heated to 960 degree Fahrenheit and dumped into the cold water. This mixes the alloy more thoroughly.

Aluminum propellers for airplanes also are forged here. Wooden propellers are much thicker and cut holes in the air so that many revolutions are lost in vacuums. These thinner aluminum propellers are used entirely by the government, according to A. Radial Pitch, superintendent.

"There it is," said Bill, "the perfect description. Just the plain facts, the core, no more, no less. Brief reference to the huge hammers, the overhead vats, sliding floors, and furnaces beside pools of water where the pistons are dumped to mix the alloy more thoroughly. The whole science and art of molding and casting compressed into about 100 words. If brevity is the soul of wit, then all I have to say is that description is the wittiest thing coming down the pike in many a long day. I wish I could cover a subject as readily.

"All of which reminds me that I had an inquiry recently from a foreign foundryman whose bronze valve bodies leaked under an air pressure of 80 pounds. The metal is melted in a direct arc type electric furnace. He had tried various combinations of metal, all high grade material and no foreign scrap. The heavy flanges necessitated the use of large risers and he wondered if these produced an open grain structure in the castings and the consequent leaks.

"Large risers are necessary on heavy flanges. To prevent oxidation, a prevalent source of leakage, the metal should be poured at a tempera-



Reporter sees a new molding machine

ture that causes the zinc to smoke. This smoke envelopes the stream and protects the metal from the oxidizing effect of the atmosphere.

"A suitable valve mixture is made up of an alloy containing copper 84 per cent, tin 5 per cent, zinc 3 per cent and lead 8 per cent. The pouring temperature of this metal ranges from 2180 to 2240 degrees Fahr. The comparatively high lead content of this alloy is favored by American foundrymen for ordinary commercial valves. The losses due to leakage is less than where mixtures containing a lower lead content is employed and the metal is quite satisfactory for ordinary steam valves. Where the specifications are more severe an alloy containing 88 per cent copper, 8 per cent tin and 4 per cent zinc is used. This metal shows a tensile strength of 40,000 pounds per square inch and 20 per cent elongation in 2 inches.

"This alloy is used on account of its density and good casting qualities and because it is not subject to the liquidation of tin, usually known as *tin sweat*. However, in common with nearly all bronzes this metal sometimes leaks in valve castings. The usual method to prevent leakage is to add a small amount of nickel to the mixture. The late Charles Vickers developed and introduced a nickel alloy for this purpose many years ago. The alloy consists of nickel 33 per cent, copper 33 per cent, tin 33 per cent and phosphor-copper 1 per cent. In this instance the phosphor-copper contains 15 per cent phosphorus. Approximately 2 per cent of this alloy is added to the valve metal, thus adding 0.66 per cent nickel to the mixture and the same amount of tin and copper. The necessary adjustment may be made in the original tin and copper content. Unless abused in some manner this metal will not leak.

"Unequal sections of metal in many instances are direct causes of leakage, but there is no use disguising the fact that certain alloys are more addicted than others to this form of defect. Too much phosphor-copper in a mixture containing zinc will result in leakers. For example a standard mixture for the better grade of steam valves contains copper 87 per cent, tin 7 per cent, zinc 3 per cent and lead 3 per cent. Leakage trouble confidently might be expected from this mixture if the copper content was reduced to 86 per cent by the substitution of 1 per cent phosphor copper. Experience seems to indicate that it is not safe to use more than 0.10 per cent phosphor-copper in this alloy. The metal is better with even less.

"Through long and varied experience, foundrymen have developed various mixtures for valve metal, depending on the size, shape and the purpose for which the valves are intended. The common valve mixture referred to previously as melted in the electric furnace carries a comparatively high lead content and is eminently satisfactory.

"A higher grade alloy widely employed for acid valves in paper mill service and containing copper 86 per cent, tin 10 per cent, phosphor-copper 2 per cent and lead 2 per cent is subject to leakage. A more satisfactory mixture for this purpose is made up of copper 87 per cent, tin 7 per cent, zinc 4 per cent and lead 2 per cent with an addition of 2 per cent of the nickel alloy mentioned previously.

"However, in any given instance before hastily jumping to the conclusion that the composition of the metal is responsible for leakage in a casting, a careful investigation should be made of all the factors involved in the sequence of production. A leaking area may contain sand washed from the sprue or gates. The defect may be caused by steam or gas from hard or wet molding sand, or from a hard or improperly vented core.

Roger W. Andrews, until recently assistant to the president, Blaw-Knox Co., Pittsburgh, has been appointed western manager for the new sales division of the Combustion Engineering Co., Inc., New York.

Use Plaster for Foundry Patterns

(*Concluded from page* 35)

square. The 9-inch square pattern will leave a cavity in which the cores may be assembled against the sides. The cores are assembled directly around the 6-inch square pattern and remain in place when the pattern is removed. Plaster or other materials of a like general character, lend themselves readily to this short cut method. Under certain conditions any given area on the pattern itself may be converted into the bottom of a corebox by placing a frame around it. Cores of this kind are particularly efficacious in position where it is difficult or impossible to dry the area by any of the usual skin drying methods.

Plaster lends itself readily to the construction of master patterns for many types of thin wall castings of which the pot shown in Fig. 21 may be taken as an example. To avoid a multiplicity of confusing detail the following description deals with a plain casting, but it is readily apparent that a spout, lugs, bosses, or brackets easily may be attached where necessary.

Wood pattern equipment includes a bottom board *M*, inside and outside guide rings *N* and *O*, inside and outside sweeps *P* and *Q* and block *R* carrying the dowel pin *S*. The rings *N* and *O*, made up of the necessary number of segments, and sawed a little over size for turning later, are nailed to the board *M*. The remainder of the structure then is built up in the usual manner so that the upper edge of each ring will come slightly inside a templet conforming to a sectional inside line of the pot.

Make Wood Frame

The structure then is placed in the lathe and the outside edge of ring *N* is turned to the required shape and diameter. The inside edge of ring *O* also is turned to a true circle to serve as a guide for the lower end sweep *Q*. When the dowel pin *S* has been trued, the structure is ready for the application of the plaster. The rings between *N* and *R* are not touched.

Fairly thick plaster is daubed over the face after the manner practiced in loam molding. Lengths of fiber, string or wire are not required in this part of the pattern. Additional plaster is spread over the surface and then the sweep *P* is pulled around to produce a smooth even surface of the desired contour. The dowel pin holds the sweep central at the top and the guide ring *N* holds it in place at the bottom. Sweep *P* then is removed and the plaster coating over the wood frame is allowed to dry for an hour or two. This dome merely constitutes a base or foundation on which the pattern proper for the pot is built.

In the second main step of the process the surface of the plaster is covered with shellac, oil, vaseline, grease or paper to prevent the succeeding plaster from adhering. Sweep *Q* is adjusted in position and a thickness of plaster is spread over the plaster covered structure. The cutting edge of sweep *Q* corresponds to the outer contour of the proposed casting. Thus after the sweep has been revolved, filling the hollows and removing the superfluous plaster, the material remaining in place will be an exact duplicate of the pot in size and metal thickness.

This plaster replica of the pot is rather fragile and for that reason it is advisable to separate it into two, four, six or more segments for convenience in handling. Assuming that six segments will be satisfactory, a pair of dividers is set to the radius of the pot where it rests on the board. By stepping the dividers around six equidistant points are marked on the board. The sweep is pulled around until the edge coincides with one of these marks. A trowel or other sharp pointed tool is laid against the sweep as shown in Fig. 21 and driven through the soft plaster, from top to bottom. The sweep is pulled around to each of the other marks in turn and the process repeated. The sweep *Q* and the guide strips *O* then are removed and the plaster is allowed to dry, preferably over night.

On the following day a cope is placed on the board, filled with sand, rammed and rolled over in the usual manner. The solid support on the inside will hold the plaster firmly in place. The board *M* with the suspended wood and plaster combination is removed and set aside. A drag is placed in position, filled with sand, rammed and covered with a bottom board. The entire assembly then is rolled over and the cope is lifted off. The plaster segments are removed one at a time. After minor repairs have been effected the mold is closed and filled with metal to form either a salable casting, or a working pattern in the event that other castings may be required.

Variations of the foregoing method readily will present themselves to an ingenious, resourceful foundryman when confronted by any given set of conditions. In one method described by Thomas Nelson several years ago in THE FOUNDRY, a dry sand core in several sections was employed to form the interior part of the mold made from a plaster pattern for a lamp post base.

In this instance only four castings were required and it was essential that pattern expense be held to a minimum and yet the pattern had to be constructed in a sufficiently substantial manner to withstand the comparatively rough usage incident to being rammed up and drawn out of the sand four times. It was decided to sweep the pattern and corebox in plaster of paris, but since the metal thickness was only 5/16-inch the pattern and corebox were made separately.

The pattern was made first by constructing a substantial wood frame and sweeping a thickness of plaster on the outside conforming to the shape of the casting. On account of the shoulder on the small end of the pattern, the sand core designed to form the inside of the casting was made in six sections with the idea of lowering them into place and then pushing them toward the mold wall after the shoulder on the core cleared the shoulder on the mold. The corebox was made by inclosing one sixth of the outside circumference of the pattern in a frame, taking a plaster impression, adding the necessary thickness and adjusting the edges on radial lines. The three internal lugs on the large end of the casting were formed by a loose piece on three cores and omitted from the others. The corebox was made 1-inch longer than the pattern at the small end and 2 inches wider at the large end.

Sweep Small End

A wood core print the full size of the core at the small end was nailed to the frame on which the plaster was swept. This print was provided with a pin in the center on which the sweep revolved. The shoulder near the small end was formed in the following manner: The sweep first was employed with a loose piece as shown at *A*, to form a seat. After this had dried, the loose piece was removed and the ring forming the shoulder was swept in place. This ring later was cut into five sections in the manner indicated at *T*. The section *U* was marked in a suitable manner so that the molder should draw it first. Each of the sections was reinforced with a large wood block from which a number of nails projected. The sectional view of the sweep *V* shows a piece of board about 12 inches long fastened to the bottom end. This piece rode on the board on which the pattern was built and kept the sweep true and perpendicular as it revolved on the spindle.

An iron plate on the bottom of the mold supported the cores and also facilitated sliding them into place. The narrow core print on the top was not sufficient to hold the heavy overhanging cores. A number of stem chaplets extending from the side of the flask were required. To make room for setting the last core it was necessory to file a small amount from the adjoining edges of the first and sixth core. The gap was filled by a narrow core made by placing stopoff strips in the corebox. This was more or less of an emergency job. Manifestly if further castings were required the opposing edges of the first and fifth cores could be formed to an angle that would permit insertion of the sixth core.

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Vibrators for all Foundry uses
From 3/8" Plate Vibrators
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New Department for Servicing Branford and Any Other Make of Pneumatic Vibrators.

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PANGBORN CORPORATION • • • HAGERSTOWN, MD.

Gray Iron Foundry Cost System

(*Continued from page* 31)

higher rates of depreciation or otherwise does not create an exemption from the calculation of depreciation for cost purposes.

VII. Loss from Bad Debts

Loss from bad debts is to be charged to variable general overhead at a percentage of sales based on past experience.

VIII. Nonoperating Items

The following items are to be considered as nonoperating items, and are not required to be included in cost: Interest on investment, interest on bonds and mortgages, and all other interest or discount items; federal income tax, sales tax; profit or loss on securities owned; donations; group life, health, and unemployment insurance. However, since this cost procedure is concerned with minimum costs only, any member may include any of the above items in his cost if he desires to do so.

IX. Flat Pricees

Individual pattern prices are not required, but:

a. Average price is sanctioned on a definite group, where definite patterns and quantity on order, or quantity per set, are specified. Cost will be checked on basis of weighted average of costs of each individual pattern.

b. Flat price on customers' requirements of particular patterns or classes of patterns specified, or on his entire requirements, is sanctioned; but contract must be subject to revision of price quarterly. Cost will be checked on the basis of average cost of the total tonnage produced during each 3-month period. Foundry must keep a record of all direct molding and coremaking labor, and of total tonnage produced on all castings covered by flat price, which will enable his average cost over each three-month period to be verified.

X. Collecting Original Cost Data

(Simplified Procedure for Small Foundries)

1. Accounting for Labor

Labor charges to the various labor accounts should be made from an analysis of the weekly payroll. The total time of all employes who have worked all week in the same department can be easily allocated. Where employes divide their time between two or more departments, a record can be kept of their actual time in each department, or their time can be allocated on the basis of an estimate of the proportion of their time customarily spent in each department.

2. Accounting for Materials and Supplies

The proper procedure is to charge materials or supplies to stock accounts, and to charge departmental cost accounts monthly with the actual amount of materials or supplies, consumed by each department. In case of sand, fuel, etc., it may be satisfactory to charge the department expense accounts monthly with a certain number of tons of sand or fuel per ton of good castings produced, based on past experience, and to credit the stock accounts monthly with the same amount, and to take inventory occasionally to see whether the rates used should be adjusted. Where the amount of materials or supplies kept in stock is small, and in the case of some other expenses, it may be satisfactory to make charges to cost accounts direct from purchase invoices, by allocating charges on the basis of the proportion customarily used by each department.

3. Melting Records

A daily record should be kept of the total weight of pig iron, classified by grades, purchased scrap, returns, and fuel charged into the cupola. Total metal charged during any period can be obtained from these daily melting records. Fuel expense in the melting department may also be obtained from the melting records.

XI. Members are expected to select one of the alternative methods sanctioned in this uniform cost and estimating system, and to use this method continuously unless the code authority is notified.

Standard Cost and Estimating Procedure

Basis methods of distributing cost in the standard procedure are practically the same as in the simplified procedure. In the standard procedure a more accurate cost is obtained by subdividing the cost divisions and figuring the cost of these subdivisions separately. The principal features of the standard procedure wherein it differs from the simplified procedure, are as follows:

I. Allocation of General Overhead to Departments:

Power, light and heat (account 100) is allocated on the basis of the metered or estimated consumption of each department. Taxes, insurance, and depreciation of buildings (account 110) is allocated on the basis of floor space in each department. Depreciation of equipment (account 111) is allocated on the basis of the value of the equipment in each department. The balance of general overhead (accounts 101, 102, and 112) is allocated on the basis of the total payroll of each department.

II. Determination of Departmental Cost and Overhead Rates:

In the standard procedure, departmental costs and overhead rates are determined by the same general methods outlined in the simplified procedure, but certain variations in cost within each department are taken account of as follows:

1. Melting Department

It is recommended that variations in the cost of melting due to variations in yield (percentage of good castings to metal poured) be taken into account, either by determining two separate rates for cost of melting (one for heavy work and one for light work), or by using a table showing the variations in cost of melting for each 10 per cent variation in yield.

2. Molding Department

The molding department is subdivided into several subdepartments such as: Crane floor, light floor, bench, squeezer, jolt, pit, sandslinger, etc. Separate departmental molding overhead percentages are determined in each of these subdivisions of the molding department. Subdivision of the molding department is recommended strongly to all foundries who desire accurate costs, for the correct overheads in these different molding subdivisions may vary in some shops from less than 80 per cent in the bench division, to more than 150 per cent in the crane floor division, and may go over 250 per cent in the jolt division.

3. Core Department

The core department is divided into several subdepartments such as: Bench, floor, core blowing machines, other coremaking machines, etc. Separate core overhead percentages are determined in each of these subdivisions of the core department.

4. Cleaning and Shipping Department

Three methods are outlined, giving varying degrees of accuracy and appropriate for various types of shops.

Method I—Advanced Method—

Recommended for shops handling very heavy work.

The cleaning and shipping department is subdivided into the following cost divisions and cost accounts:

4. Tumbling Department
- 42. All labor
- 43. All other expenses, including share of general overhead

5. Hand Sandblast Department
- 51. Hand sandblasting direct labor
- 52. All indirect labor
- 53. All other expenses, including share of general overhead

6. Automatic Sandblast Department (Barrel, table, etc.)
- 62. All labor
- 63. All other expenses, including share of general overhead

7. Pickling Department
- 72. All labor
- 73. All other expenses, including share of general overhead

8. Finishing Department
- 81. Finishing direct labor (chip grind, file, inspect, remove cores, etc.)
- 82. All indirect labor
- 83. All other expenses, including share of general overhead

9. Shipping Department
- 91. All labor (pack, weigh, load, ship, etc.)
- 92. All other expenses, including share of general overhead.

The cost per pound of tumbling, automatic sandblasting, pickling, and shipping, is determined by dividing the total cost of each of these departments by the good castings produced in his department. The cost of hand sandblasting and of chipping, grinding, filing, inspecting, removing cores, etc., is determined by keeping a record of the actual time on job, figuring the actual direct labor cost,

(*Continued on page* 74)

MODERN
Geared Ladles

Important improvements over other geared ladles are evidenced by the following exceptional *Modern* features:

1. Both ladle bowl and bail frame, independent of shank ring and gearing, preventing distortion due to expansion and contraction of ladle, and enabling easy replacement of ladle bowl.
2. Straight side ladle bowl allowing thicker lining and better jointing of bricks.
3. Worm mounted on adjustable Timken bearings, eliminating all back-lash.
4. Trunnions operating on self-aligning ball bearings to prevent binding.
5. Ladles fitted with quick-removable, refractory-lined covers and completely insulated to preserve heat.

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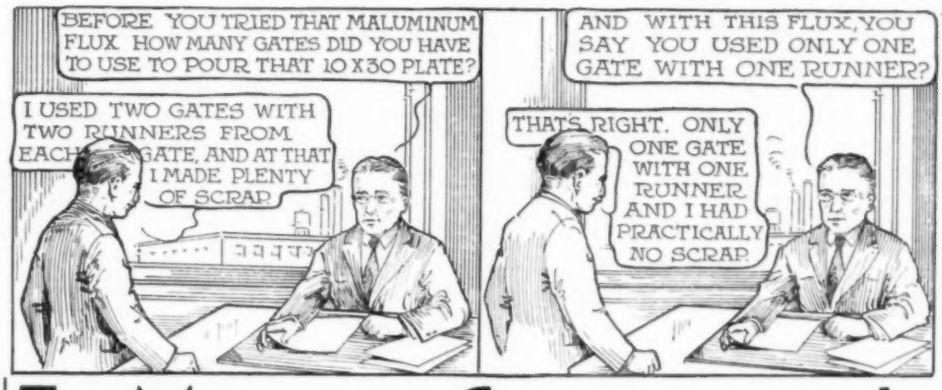

BEFORE YOU TRIED THAT MALUMINUM FLUX HOW MANY GATES DID YOU HAVE TO USE TO POUR THAT 10 X 30 PLATE?
I USED TWO GATES WITH TWO RUNNERS FROM EACH GATE, AND AT THAT I MADE PLENTY OF SCRAP
AND WITH THIS FLUX, YOU SAY YOU USED ONLY ONE GATE WITH ONE RUNNER?
THAT'S RIGHT. ONLY ONE GATE WITH ONE RUNNER AND I HAD PRACTICALLY NO SCRAP

FLUXES *for*
ALUMINUM
BRASS
BRONZE
Ladle Flux for
CAST IRON
SPECIAL FLUXES *for*
SPECIAL ALLOYS

THE MALUMINUM COMPANY TRANSPORTATION BUILDING NO. 263 **INDIANAPOLIS, IND.**

. . . A SCRAP CASTING . . .

CAN MEAN ADVANCEMENT

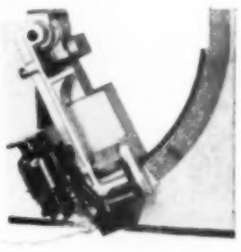
The comparison of Sand Test Figures and casting defects leads to positive corrections.

Improve now with Sand Control.

Write for the practical catalog on Sand Testing. Progress with the Leaders.

Moisture Indicator

Permeability


Universal Sand Strength Machine Type C. P.

Harry W. Dietert Co. - 676 W. Grand Blvd. - Detroit, Mich.

(*Continued from page 72*)

and adding a departmental overhead percentage.

Method II—Modification of Advanced Method—Recommended for shops handling both light and heavy work.

The same classification of accounts is carried. Flat costs per pound are determined in all subdepartments. In the hand sandblast and finishing departments, departmental overhead percentages are also determined. In these two departments the time is not taken up on every job (as in method I), but time is reported on all special jobs requiring an excessive amount of sandblasting or finishing labor, on very heavy jobs, or on any job on which an especially accurate cost is desired. On these jobs the direct labor cost is figured, the departmental overhead is added and an accurate cost thereby is obtained. On all other jobs the flat rates per pound are used to determine the cost of hand sandblasting or finishing.

Method III—Flat Departmental Tonnage Rates—Fairly satisfactory for light work shops.

The same classification of accounts is carried, except that it is not necessary to separate direct labor from indirect labor in the hand sandblasting and finishing departments, for no departmental overheads are figured. A flat cost per pound of good castings produced is figured for each department, and these flat rates are applied to all normal jobs. If some special jobs require an abnormal amount of finishing time, the regular rate per pound for finishing is increased by an amount which is considered sufficient to cover the cost of the extra work performed.

III. Auxiliary Departments

In most foundries there are usually several auxiliary or service departments which are operated in connection with the foundry such as power, light and heat department, carpenter shop, pattern shop, repair machine shop, etc. The standard procedure for handling the cost of auxiliary departments is to set up separate cost divisions for each department, to charge each department with its proper share of general overhead, and to distribute the total cost of each department as follows:

Power, Light and Heat Department

Total labor and expense is charged to power, light and heat account, and distributed as outlined under standard procedure.

Carpenter Shop, Pattern Shop, and Repair Machine Shop, etc.

Direct material and direct labor are charged direct to job orders. Departmental overhead, including share of general overhead, is distributed as an overhead percentage on direct labor cost. Job orders are charged either direct to customer, or to the manufacturing or auxiliary department for which the work was performed, or to general expense.

Where separate cost divisions are not set up for the above auxiliary departments, as much of the cost of these departments as can be specifically followed and charged direct to customers or to one of the manufacturing departments should be so charged, and the balance should be charged to variable general expense.

IV. Where direct labor is specified as a basis for distributing overhead, man hours or machine hours may be used at the discretion of the individual member.

V. Members are expected to select one of the alternative methods sanctioned in this uniform cost and estimating system, and to use this method continuously unless the code authority is notified.

Detailed Definition of Accounts

The following definition of accounts gives a list of some of the most important items which are to be included in each cost account in the simplified procedure. These items are listed in such a manner as to indicate certain subdivisions which may be advantageously handled as separate cost accounts, if desired, to give a more detailed analysis of cost and better cost control. The list is not intended to include all the items chargeable to each account, but by using it as a guide there should be no difficulty in properly classifying any other items which are not specifically mentioned.

I. Melting Department

10. Pig iron, purchased scrap (iron or steel) and alloys, including freight and cartage.

12. All labor in the melting department, such as:

a. Unloading or transporting iron, scrap, or fuel; charging, tending cupola, patching; craneman; hauling out slag and ashes; lining ladles, etc.
b. Repair labor, relining cupola, etc.
c. Metallurgists, chemists (time spent on metals), etc.

13. All other expenses of the melting department, such as:

a. Melting fuel, including freight and cartage.
b. Supplies and tools, such as flux, fire-brick, fire-sand, fire-clay, wood or oil for lighting, coke forks, etc.
c. Repair expense such as cupola block, for relining cupola, etc.
d. Laboratory expenses, chemical analysis (on metals), etc.

II. Molding Department

21. Molding direct labor-molders, apprentices, molder helpers, and any other labor in the molding department that can be allocated to individual jobs, such as ramming, finishing core setting, etc. Pouring time should be included in direct labor in shops or departments where the molders pour their own work; in indirect labor where pouring is done by a pouring gang.

22. All indirect labor—All other labor in the molding department, such as:

a. Transporting molten iron, fuel, sand, castings, patterns, flasks, boards, bands, supplies, etc.; cranemen pouring if done by separte pouring gang; preparing molding sand; mixing facing sand; shifting weights, shaking out molds, breaking gates, cleaning up floors; tending mold-ovens; gangway helpers whose time cannot be allocated to specific jobs, etc.
b. Pattern and flask labor not chargeable to customer.
c. Repair labor-repairs to equipment in molding department.
d. Foremen and clerks.

23. All other expenses in the holding department such as:

a. Molding sand, including freight and cartage.
b. Supplies and tools, such as: Shovels, riddles, brushes, rammers, clamps, gaggers, chaplets, nails, air hose and fittings, facings, sea coal, plumbago, parting, fuel for mold ovens, etc.
c. Pattern and flask expense not chargeable to customers.
d. Repair expense—Repairs to equipment in molding department.

III. Core Department

31. Coremaking direct labor—coremakers, apprentices, coremakers helpers and any other labor in the coremaking department that can be allocated directly to individual jobs, such as: Venting, blacking, pasting, assembling, filing, rubbing, gaging, etc.

32. All indirect labor—All other labor in the core department such as:

a. Transporting core sand, core boxes, and cores; cranemen; mixing core sand; tending core ovens, etc.
b. Pattern labor on core boxes, not chargeable to customers.
c. Repair labor—Repairs to equipment in the core department.
d. Foremen and clerks.

33. All other expenses of the core department such as:

a. Fuel for core ovens.
b. Core sand including freight and cartage.
c. Supplies and tools, such as: Core compounds, core oil, glutrin, molasses, shovels, riddles, brushes, rammers, core plates, core wire and core rods, nails, etc.
d. Repair expense on core boxes, not chargeable to customers.
e. Repair expense — Repairs to equipment in the core department.

IV. Cleaning and shipping Department

42. All labor in cleaning and shipping department, such as:

a. Tumbling, sandblasting, pickling, removing cores, chipping, filing, grinding, sorting, inspecting, gaging, packing, shipping, weighing, loading, trucks, moving, castings, cleanup labor, welding or otherwise repairing castings when not chargeable to customers, etc.
b. Repair labor—Repair to equipment in the cleaning and shipping department.
c. Cleaning room foreman and shipping clerks.

43. All other expenses of the cleaning and shipping department, such as:

a. Tumbling stars, sandblast sand, steel shot, grinding wheels, chipping hammers, and chisels, sandblast hose and nozzles, welding torches and tips, oxygen and acetylene; bags, barrels, boxes

(*Concluded on page 77*)

ADVERTISING PAGES REMOVED

(*Concluded from page* 74)

and crates, when not chargeable to customers, etc.

b. Repair expense — Repairs to equipment in the cleaning and shipping department.

V. Variable General Overhead (included at actual cost)

100. Power, light, and heat.

a. Cost of all purchased electric power.

b. Labor, fuel, supplies and tools, repairs, etc., in boiler and engine room.

101. Workmen's compensation insurance.

102. Variable general labor and expense.

All general labor and expense which cannot be allocated to one of the manufacturing departments, and which varies approximately in proportion to output such as : Miscellaneous plant general labor and expense, general repairs, waste removal, etc.

VI. Nonvariable General Overhead (normalized)

110. Depreciation of building, taxes and insurance.

a. Depreciation of buildings.

b. All taxes except income taxes and sales taxes.

c. Fire insurance and all other insurance (except Workmen's Compensation Insurance, Group Life, Health, and Unemployment Insurance).

111. Depreciation of equipment.

113. All other nonvariable expense such as:

a. Rent.

b. General supervision — Superintendent, general foreman, etc.

c. Nonvariable general labor such as watchmen, janitors, etc.

d. Administrative and selling expense, directors fees, dues, subscriptions, advertising expense, legal expense, auditing expense, etc.

Cast Iron Test Pavement is Laid

(*Concluded from page* 33)

Castings made to these specifications are about as cheap as can be made in the Minneapolis district. They are not quite as good in impact strength as the English castings but if they are satisfactory for paving purposes they will be much cheaper to make in that locality than would be the case if the English analysis were duplicated. The most severe service will be caused by heavy impact in subzero weather. If cracks appear in the blocks, it is a simple matter to replace them with blocks of a different analysis. By this method of trial and error it will be possible to develop an analysis and a design that will be the cheapest possible for this locality and for the climatic and traffic conditions that the blocks must withstand.

Apparently there are no basic patents covering the use of metal paving blocks. The three-point support idea is covered in England at least, but just how valuable this idea may be has not been definitely determined. In the largest single installation in England, the Mersey Tunnel pavement, square blocks were used which rest on the concrete at a number of points. From the information available at the present time it seems that with the exception of the use of the three-point support idea and the use of sulphur-coated chills in hardening the studs, any type of block desired may be made. If funds are made available, the mines experiment station hopes to work on the design and chemical composition of castings most suitable for paving purposes. The idea will be to attempt to develop suitable types for use in this country that can be manufactured cheaply from local scrap, pig iron, or hot metal from blast furnaces.

Obituary

CARL V. DODGE, vice president and manager of sales of rolls and steel castings for United Engineering & Foundry Co., Pittsburgh, died at Pittsburgh, Oct. 16, after a prolonged illness. He was also a director of the company, and was widely known in steel mill equipment building circles.

Mr. Dodge had been identified with the United Engineering & Foundry Co. for 30 years. He began his career as a shipping clerk in the foundry department at Vandergrift, Pa., became a salesman in the Pittsburgh office in 1913 and was elected vice president in charge of roll and steel casting sales in April of 1933. During his long and active business career he played an important part in the development of cast steel annealing boxes.

♦ ♦ ♦

J. J. Rowbottom, secretary, Diversey Foundry Co., Geneva, Ill., died recently in Oak Park, Ill.

♦ ♦ ♦

Richard C. Faunt, founder and president of the Faunt Bros. brass foundry, Chicago, died recently.

♦ ♦ ♦

R. Y. Ferner, R. Y. Ferner Co., Washington, importer of precision machinery and scientific instruments, died in Washington Oct. 7.

♦ ♦ ♦

Louis B. Straver, 50, assistant secretary and treasurer, Joy Mfg. Co., Franklin, Pa., died recently in Franklin following a brief illness.

♦ ♦ ♦

Edward V. Anderson, vice president of the Golden-Anderson Valve Co., Pittsburgh, and a director of the Monessen Foundry & Machine Co., Monessen, Pa., died recently.

♦ ♦ ♦

Franklin M. Bowman, 60, vice president of the Blaw Knox Co., Blawnox, Pa., since 1912, died at Pittsburgh, Oct. 12. He was formerly associated with the Riter-Conley Co., Pittsburgh.

♦ ♦ ♦

A. Walter Lorenz, 44, head of the research laboratory, Bucyrus-Erie Co., South Milwaukee, Wis. died recently. Mr. Lorenz was born in New Castle, Del., and had been connected with the Bucyrus-Erie Co. for 18 years.

♦ ♦ ♦

Elmer E. Arensberg, 64, president of the McCollough-Dalzell Crucible Co., Pittsburgh, died at his home in Pittsburgh, Oct. 18, after an illness of several months. He was a native of Pittsburgh and had lived in that city for many years.

♦ ♦ ♦

Francis J. Youngblood, 54, for the past 12 years manager of costs for the Detroit Brass & Malleable Works, Detroit and Wyandotte, Mich., died Oct. 21. Mr. Youngblood was a graduate in mechanical engineering of Stevens Institute of Technology, and formerly was associated with J. G. Brill Car Co. and the British Westinghouse.

♦ ♦ ♦

Reese Thomas Harris, 74, for many years connected with the iron and steel industry, died Oct. 17 in Buffalo. Mr. Harris was born in Wales and began working in Welsh iron and steel plants when he was 9 years old. He became one of the foremost experts in the open-hearth process in Europe and is credited with bringing the process to the United States about 45 years ago.

♦ ♦ ♦

John A. McFarland, 52, secretary-treasurer and manager of the Pottsville Foundry & Stove Co., Pottsville, Pa., died recently. Mr. McFarland was born in Warrior Run, Pa. He went to Pottsville as representative of the York Safe & Lock Co. and later took over the managership of the foundry, which formerly had been the Derr Foundry. He was also associated with the International Screen Mfg. Co. and established the Foundry Parking station adjoining the Pottsville foundry.

♦ ♦ ♦

Dr. Calvin W. Rice, 65, for 28 years secretary of American Society of Mechanical Engineers, died in New York, Oct. 2. After graduating from the Massachusetts Institute of Technology in 1890, he joined the Thomson-Houston Electric Co. and was employed there until 1893 when he became connected with the General Electric Co. Subsequently he was associated with a number of mining and utility interests. In recent years he conducted considerable research for the General Electric Co. especially in connection with radios.

KORDEK

Reg. U. S. Pat. Off.

The *Outstanding* Core Sand Bond

. . . IT may be mixed in large quantities, and used as needed.

Bakes in the shortest time and at the lowest temperature.

Makes cores that have sharp edges and keeps them.

Leaves a clean core box.

Stands up when metal is poured, and gives off the least smoke and gas.

Produces castings of the highest grade with the smallest percentage of blow-holes and imperfections.

Breaks out of castings with greatest ease.

Let us help you with your problems — our practical foundrymen are at your service.

CORN PRODUCTS REFINING CO.
17 Battery Place, New York, N. Y.

*3

Ellwood
FOUNDRY NAILS

Light, strong, economical. Serrated to provide extra grip on the sand. Extra large heads insure against breakdown of mold during pouring. If you have been using ordinary nails for this purpose, start using Ellwood Foundry Nails because they go three times as far.

Ellwood Foundry Nails are available in sizes from ½" to 8".

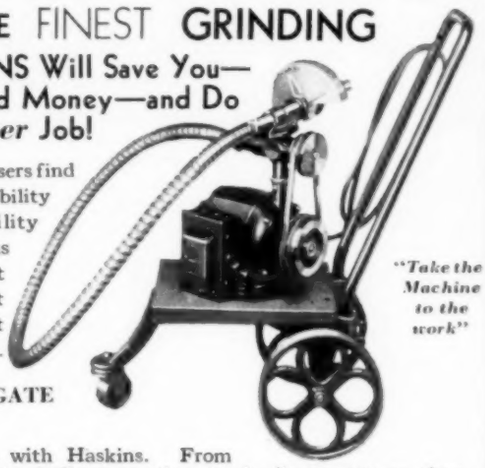
Makers of foundry nails for 20 years!

Order from your local foundry supply house or direct from us.

ELLWOOD STEEL CORPORATION
Ellwood City, Pa.
(*Pittsburgh District*)

FROM THE **HEAVIEST**
TO THE FINEST **GRINDING**

HASKINS Will Save You—Time and Money—and Do A *Better* Job!



"Take the Machine to the work"

Foundry users find the portability and flexibility of Haskins equipment mean most efficient production.

INVESTIGATE TODAY

Modernize with Haskins. From the heaviest grinding operations to the finest pattern shop work—you'll find a Haskins Equipment built to serve your needs. In Foundries where portability is desired, Haskins Floor Truck Equipment shown here is recommended. Investigate the adaptability of Haskins Equipment for your needs—

Write for catalog.

Haskins

FLEXIBLE SHAFT EQUIPMENT
4635 W. Fulton St. Chicago, Ill.

MOGUL

Reg. U. S. Pat. Off.

Made by an Original and Unique Process

▼

For Better Castings at Lower Cost

MOGUL has proved exceptionally efficient for cores requiring green bond and for all conditions where green bond is a factor. Cores do not sag or swell, they come clean from core boxes — and have the right porosity for free venting.

MOGUL is a perfect green sand bond for facings—it produces maximum strength yet simultaneously gives natural vents in the sand.

Let us help you with your problems —our practical foundrymen are at your service.

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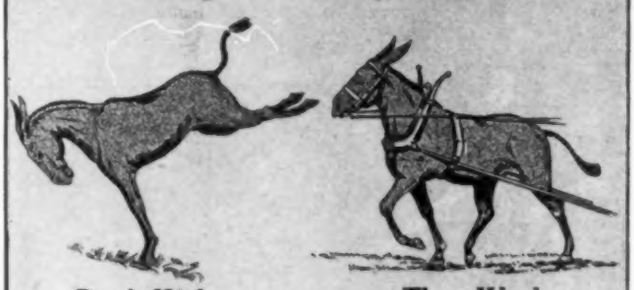
*4

Beryk Vibrators



Don't Kick **They Work**

The BERYK *Co*
Builders of
FOUNDRY VIBRATORS
1265 *West Second St* *Cleveland, O.*

Cupolas Supply Iron Continuously

(*Concluded from page 30*)

by Carl A. Harmon, a typical example assumes a blast volume of 6000 cubic feet per minute and a moisture content of 7 grams per cubic foot.

6000 × 7 = 42,000 grams H_2O per minute

42,000 × 60 = 2,520,000 grams H_2O per hour

7000 grams = 1 pound avoirdupois

2,520,000 ÷ 7000 = 360 pounds H_2O per hour

1 pound H_2O requires 0.666 pounds C. for dissociation

360 × 0.666 = 240 pounds C. for 360 pounds H_2O

Coke at 92.00 per cent fixed carbon

240 ÷ 92 = 260.7 pounds coke per hour

Spread over 15 or 16 charges the amount of coke is not impressive, but is illustrative of the close control exercised over every factor involved in melting.

Control Cupola Operation

Through instruments and gages of various kinds in the control room, close check is kept on the performance of each cupola. Hourly and cumulative tonnage melted, volume and pressure of blast and other pertinent factors are chalked up on a blackboard on the wall and later transferred to permanent record. Constant check is kept on the analysis of the iron to maintain uniformity of product.

In general the iron falls into three main classifications, hard, medium and soft. Hard iron for cylinders has a silicon content of approximately 2.00 per cent. Medium iron for pistons contains 2.25 per cent silicon. Soft iron for bearing, caps, manifolds, housings, etc., carries silicon to the extent of approximately 2.50 per cent. Extra soft iron with a silicon content of 2.75 per cent for carburetor castings is secured by ladle additions of powdered ferrosilicon. A similar method is pursued in raising the manganese content to 1.00 per cent in the iron poured into the tappets. This is a hard iron in which the lower end of the casting is chilled to a depth of ⅛-inch against an iron plate.

In addition to the regular grades of pig iron, silvery iron, foreign and domestic scrap, the cupola charges contain varying amounts of cast iron briquets shipped from the corporation's various machine shops and pressed into shape at Flint, Mich. Steel scrap arrives in the form of flashings from the forge shops, convenient in weight, size and composition for cupola use.

Cupola tuyeres are located 30 inches above the sand bed, thus providing a well or mixing chamber with a holding capacity of about 5 tons of molten iron. An ingenious patented system of signal lights keeps the tapper and the man in the control room above constantly informed of the depth of metal in the well. Specially constructed carbon plugs are built into the lining at several points. As the metal rises in the well and touches each of the plugs in turn the lights are flashed at the two observation stations. Manifestly there is not much leeway where the metal is coming down at the rate of 22 tons per hour and is tapped into a succession of 1-ton ladles, at less than 3-minute intervals. Clock like, precision, speed and skill characterize the movements of the men who distribute the molten metal. The ladle is mounted in an electric crane suspended from a monorail. The driver travels in a cab separated from the ladle by a steel plate shield. At certain designated points the driver pours the metal from his ladle into a second ladle propelled by hand and suspended from a lighter auxiliary monorail.

Ladles travel past the cupola on two parallel monorail lines. Ladles on the line nearest the cupola are filled from the regulation or standard spout about 5 feet in length. Ladles on the outer line are filled from a secondary or auxiliary spout, an extension to the first. The second spout is mounted on a pedestal below the first. The inner end is anchored to the pedestal through a swivel joint which permits the tapper to swing it into extension position for filling the outer ladles, or swing it to one side when a ladle approaches on the inner monorail. Movement is effected through an upright lever attached at the bottom to a horizontal member connected to the closed end of the spout.

Favor Composition Lining

Brick linings in the ladles have been discarded in favor of a composition made up of 2 parts pulverized fire brickbats, 2 parts old molding sand and 1 part fire clay. This mixture is slightly moistened with water and prepared in a muller in a room set apart for the purpose on the ground floor between the two batteries of cupolas. The ladles are brought in here on lift trucks. The old linings are knocked out and the new material is rammed against the bottom and sides to a thickness of about 2 inches. The mixture is built up around the walls by hand and then rammed quite hard with a piece of 2 x 2-inch stick about 2 feet in length. The result is a smooth, hard lining which remains in constant service for approximately a week. The newly lined ladles are lifted by truck or chain block and placed upon a roller conveyor where the lining is dried with an oil torch.

The burned section of the cupola around the melting zone is repaired with brick after every heat. Mud for laying the brick is made up of 2 parts old molding sand and 1 part crushed fire brick, prepared in the same muller and reduced to a working consistency with water.

This is the second of four articles dealing with the Chevrolet foundry of the General Motors Corp., Saginaw, Mich. The third of the series will appear in an early issue.

THE EDITORS.

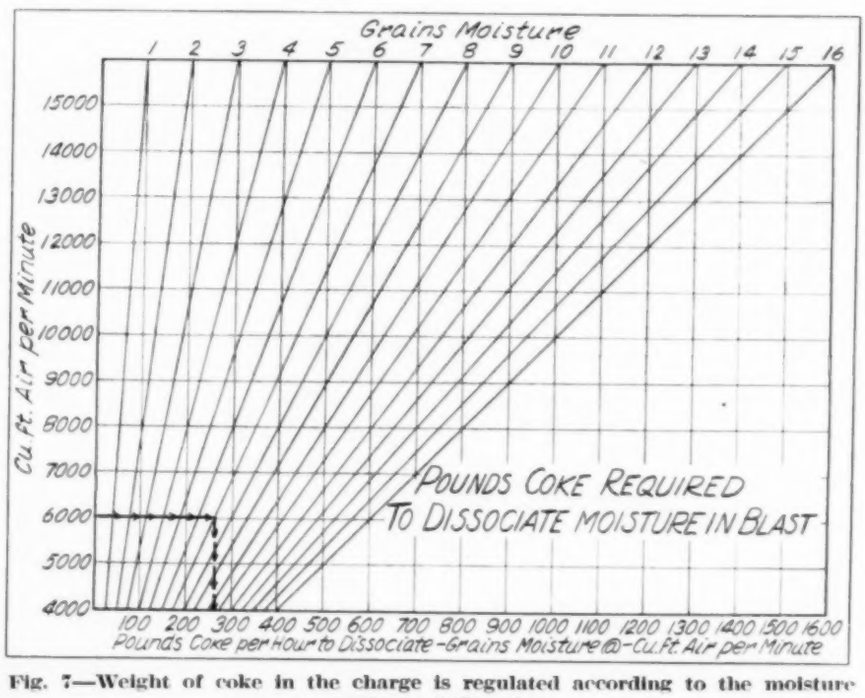


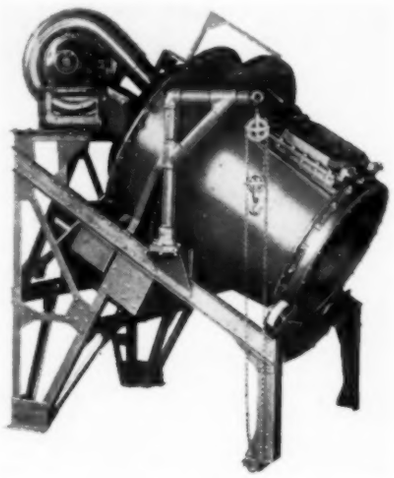
Fig. 7—Weight of coke in the charge is regulated according to the moisture content of the air

New Equipment

For Foundries

Barrel Combines Tumbling and Blasting

W. W. Sly Mfg. Co., 4703 Train avenue, Cleveland, recently has introduced a new barrel-type unit for cleaning castings, which employs a blower to supply the blast. The barrel has an



A blower at the front of the machine provides the blast to direct the abrasive against the work

inner and outer shell with the inner shell 42-inches in diameter and 36-inces deep. The inner shell is of ¾-inch steel, perforated with ½-inch holes to provide an outlet for the abrasive, dust and dirt. An outer shell of 3/16-inch steel, slightly tapered, is attached to the mill barrel and revolves with it. A spiral flight conveyor is provided in the space between the outer and inner shell to bring the abrasive to the forward high end of the tilted mill, where the material falls into buckets which raise it and discharge into a feed hopper over the blower. This hopper feeds the abrasive to the nozzle.

A blower direct connected to a 10 horsepower motor is mounted against the high end of the tilted barrel, with a nozzle which directs the blast into the barrel at an angle. The bottom headplate of the barrel is cone-shaped and corrugated to give the castings a turning-over action. The nozzle is so arranged that the blast will hit the center of the load as it creeps up on one side of the revolving barrel. A gearhead motor, which is a part of the mill construction, drives the unit. The motor has two speeds, permitting the mill to revolve at 6 or 12 revolutions per minute. At 12 revolutions per minute the mill can be used for tumbling without blast and at 6 revolutions it can be used as a blast mill. However, it can also be used as a combination tumbling and blast mill by running at 12 revolutions per minute with the blast on.

The rate of feed of the abrasive is about a cubic foot per minute, weighing in the case of metal abrasive, about 285 pounds, so that a total of 8 or 9 tons of abrasive passes through the system per hour of blasting. Air entering the barrel with the abrasive is taken out through the perforation in the shell and is exhausted through two dust pipe connections at the high end of the mill. This air passes through the abrasive as it is returned to the feed hopper so that a cleaning action is provided.

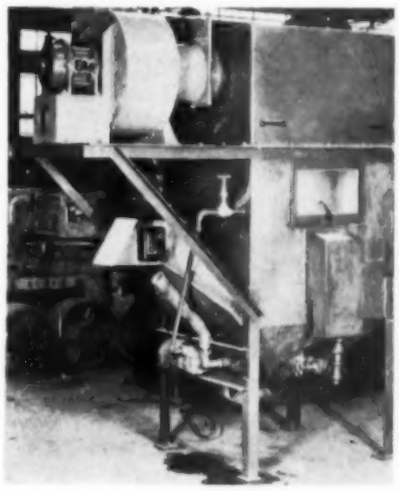
The door for loading and discharging is on the side of the barrel and has an opening 24 x 28-inches long. The load capacity of the barrel is about 10 to 15 cubic feet of work, representing approximately 1000-pounds of castings, depending upon the type and size and nature of the work. The barrel revolves at 30 degrees from the horizontal.

Heater Designed To Operate Quietly

Fedders Mfg. Co. Inc., Buffalo, recently has introduced a new line of unit heaters for both commercial and industrial application. In the design of the heater, special attention has been paid to the factor of quietness. Streamline tubes, special fins and sturdy cabinets combined with resilient motor mountings are said to eliminate resonance and to isolate vibration. The heaters are made in a complete line of capacities up to 1200 square feet E. D. R. steam.

Air Filter Uses Flotation Principle

C. O. Bartlett & Snow Co., 6200 Harvard avenue, Cleveland, recently has introduced a new line of equipment for filtering air, which employs a frothing agent and operates on the



Air Filter Uses Flotation Principle Dust laden air passes first through water and then through the frothing agent

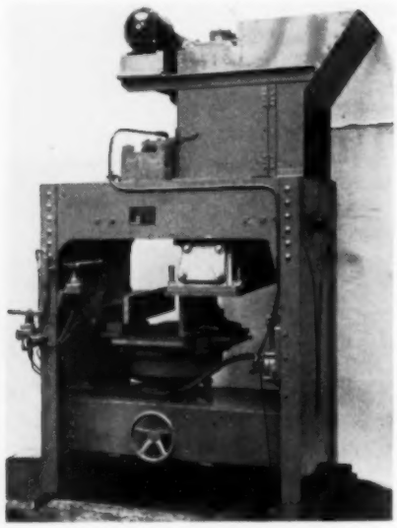
flotation principle. The air filter is so designed that it has no moving parts. Dust-laden air is drawn through ducts to a distributing chamber. The air then is passed upward through vents and deflected downward by hooded bells passing first through water, then through a filter carpet before being discharged by an exhaust fan. Both the water and the frothing agent are in constant motion. It is claimed that the water removes the larger dust particles and that the fine dust particles are trapped by the frothing filter carpet.

It is pointed out the air filter is adapted for use in both large and small foundries. Standard sizes already developed are capable of cleaning from 1000 to 25000 cubic feet of air per minute. Two or more units may be installed in parallel when larger capacities are required. Water

is piped in at one side of the filter and drawn off at the other at a uniform rate of 20 gallons per minute for a 10000 cubic foot per minute machine. If oil is used as a frothing agent, from two to three quarts is said to be sufficient for an eight-hour operation. The unit requires only the power necessary to circulate the water and drive the exhaust fan.

Introduces Three Large Core Machines

Wm. Demmler & Bros., Kewanee, Ill., has introduced three large type core machines designed specially for automotive work. One machine is used for making cores for cylinder



Large machine designed for eight cylinder automobile cores

heads, manifolds, tappet housings, water jackets, cylinder and crank case sections, and transmission housings. This machine has a capacity sufficient to make cores for straight eight cylinder motor blocks. The unit is equipped with a semi-automatic operating valve which controls the various operations of the machine in sequence. The unit is built on a structural steel frame which can be supplied in any desired height. The crosshead is of cast steel and has a large throat opening. The machine may be equipped with a motor driven and feeding device to provide a constant flow of sand.

A second machine, designed to do the same class of work, is built on a welded steel frame and the cylinders which move the sand magazine from filling to blowing position are enclosed in the frame. A motor driven sand feeding device is provided. The machine has a capacity of as high as 300 jacket cores per hour.

A third machine, designed especially for eight cylinder automobile cores, is shown in the accompanying illustration. The unit is designed to supply a flow of sand above the entire core, and has various special features.

New Material Resists Abrasive Wear

A new material with a hardness approaching that of the diamond recently has been developed in the research laboratories of the Norton Co., Worcester, Mass., and now is available for many industrial applications. The new material, which is boron carbide, is an electric furnace product made similarly to silicon carbide, and has a hardness of 14 on a modified Moh scale on which silicon carbide is rated 13, and the diamond 15.

Raw materials used in the formation of boron carbide are pure anhydrous boron oxide and high purity petroleum coke which react at high temperature in a resistance type electric furnace. Boron carbide according to the manufacturer is unaffected by the strongest acids and alkalies, has a compressive strength of 260,000 pounds per square inch, a coefficient of expansion of approximately two-thirds that of steel, is little affected by temperatures up to 1832 degrees Fahr. at which point the diamond burns completely, and is lighter than aluminum.

Industrial applications of boron carbide depend entirely on its intrinsic hardness, and include uses as a wear resisting material and as an abrasive. One important use of primary interest to foundrymen is that for the construction of abrasive blasting nozzles. Extended service tests of boron carbide in the molded form indicate that it has exceptionally long life.

Traps Refuse in Compressed Air Lines

Cleveland Pneumatic Tool Co., Cleveland, has introduced a new line strainer designed to be placed at individual air outlets to trap scale, grit, and trash and to prevent clogging of air screens. The screen-opening area is six times the outlet of the strainer. The strainer may be cleaned occasionally by opening the petcock at the bottom, and by unscrewing the bottom plug the screen may be removed for more thorough cleaning. The strainer is made in three sizes, ½, ¾, and 1-inch.

Foundry Sand Screen Combines Several Motions

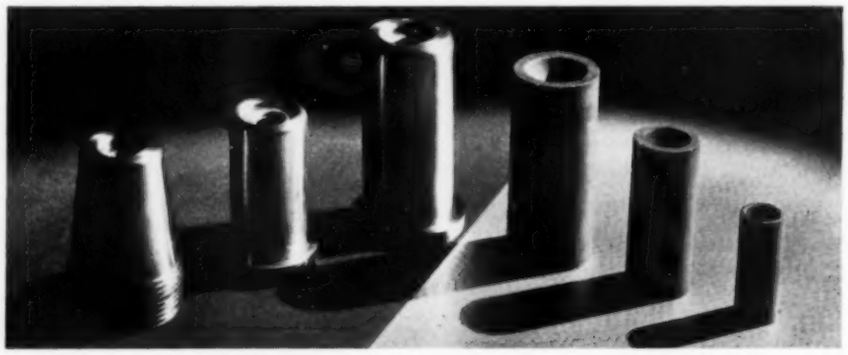
Beardsley & Piper Co., 2541 N. Keeler avenue, Chicago, recently has introduced a new gyratory screen for foundry use, as shown in the accompanying illustration. The new screen is designed to operate with a

The operating mechanism of the foundry screen is sealed against dust

combination of circular, vertical oblique and forward and backward movement. It is claimed that the design of the unit prevents vibration from being imparted to the adjacent superstructure. The screens may be changed quickly and easily. The operating mechanism is dust-sealed and special attention has been given to provide a simple means of lubrication. Only 1 horsepower or less is required to drive these screens. The screens are made in types and sizes to fit a wide range of applications.

Making Aluminum

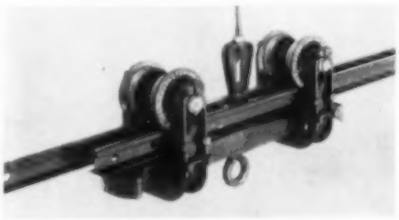
A process for the manufacture of aluminum involving the use of alunite ore, and which, it is claimed, results in a purer product, has been announced by the Bohn Aluminum & Brass Corp., Detroit.



Blasting nozzles and liners produced from the new boron carbide

Carrier System Built with Two Rails

Joy Mfg. Co., Franklin, Pa., recently has introduced a twin rail system which facilitates the handling and elevating of materials in the foundry. The system is constructed with a swivel at track tread level, providing proper carrier alignment,



The system has a swivel at the track level

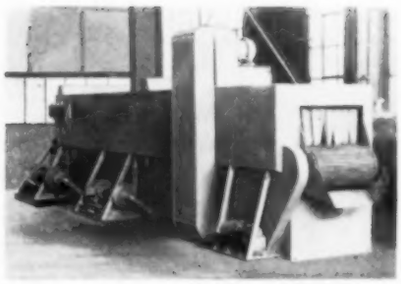
maximum traction and automatic embankment on the curves. All joints of the rails are staggered so as to give smoothness and speed of operation. Rails are welded together with spacers and the rails are supported on various types of fittings designed with a large factor of safety. Carriers are dust-proof and are built to withstand severe service.

The twin rail system may be either by hand or electrically propelled and can be used for handling sand, scrap, charging cupolas, handling hot metal from cupola to the various floors, transportation of castings to cleaning, inspection and shipping departments. The units may be used for supporting heavy swing frame grinders and pouring metal into the molds.

Washes Metal Parts Continuously

A new continuous type washing machine for cleaning metal parts has been introduced by N. Ransohoff Inc., Cincinnati. Work to be cleaned enters the machine from a belt or chute and travels through the equipment on an endless woven wire conveyor. This flexible mesh belt runs over drums at loading and unloading ends and is supported by track and rollers. The work travels through the conveyor tunnel at the rate of 20 feet per minute.

Five operations are involved in cleaning the parts, namely, washing, draining, rinsing, second draining and drying. Washing compound and rinse water are sprayed upon the work from top and bottom through perforated pipes which extend from the sides of the machine for ease in cleaning. The cleaning compound is pumped from a tank in the bottom of the machine. The tank is equipped with a skimming dam to eliminate scum. The compound is heated by



Work travels through the conveyor at the rate of 20 feet per minute

steam coils on three sides of the tank.

The rinse water tank is served by an individual pump, has a skimming dam and is heated by the exhaust from the wash tank through perforated pipes extending from the steam coils.

Following the rinse, the work is given a final spray with hot water from the regular water line. It then is subjected to blasts of hot air from slotted pipes above and below the conveyor, the air circulating back to the steam coils for reheating. Provision is made for controlling the amount of fresh air drawn in. Four motors drive the wash pump, rinse pump, blower and conveyor.

Front and Back of Shovel Blade MadeSmooth

Wood Shovel & Tool Co., Piqua, O., recently introduced a new closed back shovel, shown in the accompanying illustration. This new tool in many ways resembles the familiar hollow back type except that, instead of the usual hollow in the back of the blade, a steel plate is welded securely to the blade and extends up into the socket. However, the upper part of the plate is free to permit flexing and, since there is no strain on the insert, it cannot pull loose, it is claimed. By this construction, the one piece steel blade is made smooth both front and back, and yet permits the use of tapered socket which is heat-treated to provide greater strength and springiness than a heavy solid shank offers.

Other features in the shovel are the straight handle and turned shoulder.

A steel plate is welded in the back of the blade

To replace a handle it is only necessary to push the new handle into position and replace two rivets. The turned shoulder consists of a lapping over of the metal at the top of the blade and the pressing of this double thickness of metal into a sturdy beading which is said to give greater strength to the frog, eliminate blade splitting and provides greater foot comfort for workers.

Uses Goggle for Welding and Chipping

Wilson Products, Inc., Second, Washington and Thorn streets, Reading, Pa., recently announced a new style goggle which is designed to combine the protective qualities of both chippers' and welders' types in one

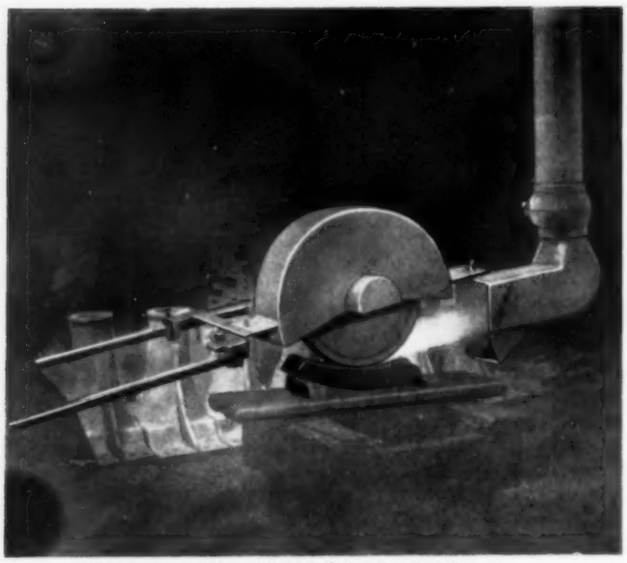
Goggle arranged for welding at top and for chipping at the bottom

unit. The top view in the accompanying illustration shows the goggle arranged for welders. The weld lenses in this case provide protection against dangerous light rays, glare, etc. The special lenses in the lower view offer protection against impact, flying chips, etc. The goggle is used open for chipping and closed for welding. Other features of design include ample ventilation through indirect ports, an adjustable leather nose bridge and elastic headband.

Purchases Plant

Link-Belt Co., Chicago, has purchased the physical assets of the Bailey-Burruss Mfg. Co., 1116 Murphy avenue, Atlanta, Ga. and all divisions of the Atlanta sales office of the Link-Belt Co. will be moved to that plant. Operations will be in charge of I. H. Barbee, formerly of the Philadelphia plant of the Link-Belt Co. Other members of the Atlanta office include R. L. Lowder, J. R. Martin, and J. O. Bailey.

KIRK & BLUM
Dust Collecting Systems



Swing arm grinder with K & B hood and piping

K & B Piping & Hoods on Battery of Snaggers

Cut Costs—Safeguard Health

It is wise to specify Kirk & Blum Piping because it saves power and lasts longer.

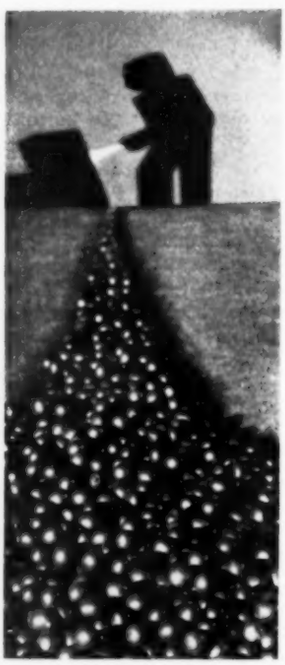
THE KIRK & BLUM MFG. CO., *2808 Spring Grove Ave., Cincinnati, O.*

Detroit Factory and office: 4718 Burlingame

Pittsburgh Representative: The Bushnell Machinery Co., 1501 Grant Bldg.

Louisville Representative: Liberty Blow Pipe Co., Inc., 325 Roland St.

"CERTIFIED"



STEEL SHOT and GRIT

FOR ALL BLAST CLEANING

• • Twenty bags of this popular abrasive will do the work of a car load of sand.

Easier to use.

Easier to store.

Decreases dust.

Easily cleaned.

Used over and over again.

Send for information

Manufactured only by

PITTSBURGH CRUSHED STEEL CO., PITTSBURGH, PA.

STEEL SHOT AND GRIT CO., AMESBURY, MASS.

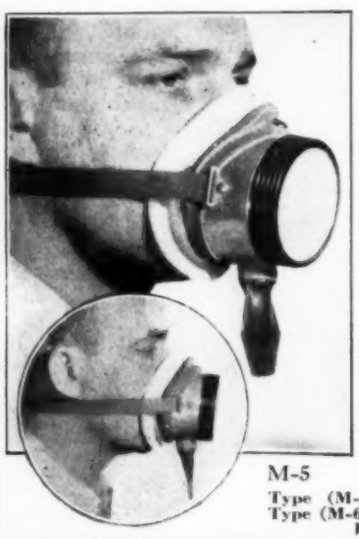
"Certified" Steel Abrasives are recommended by leading Blast Cleaning Manufacturers

Pulmosan

REG. U. S. PAT. OFF.

IMPROVED RESPIRATORS

The new "M" Series Improved Pulmosan Dust Respirators are designed to meet the need for a heavy duty respirator to combat severe industrial dust conditions.



M-5

- Filter 3" diam.
- Larger Wire Mesh
- Low Breathing Resistance
- Positive Exhaust Valve
- All Rubber Headbands
- Goggles Easily Worn
- Designed by Dust Control Engineers

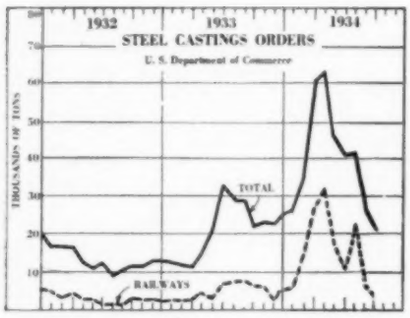
The Type "M-5" (illustrated) embodies the above new features. Lower breathing resistance due to direct air flow to the face. The body is one piece aluminum shell, threaded at outer rim so filter cap can be readily attached.

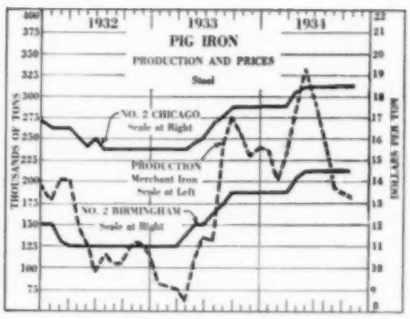
Type (M-4) without exhaust valve
Type (M-6) exhaust and intake valve

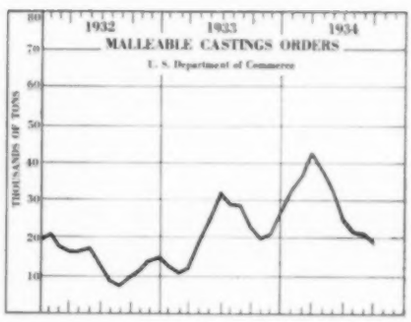
Write for literature

PULMOSAN SAFETY EQUIPMENT CORP.

176 Johnson St. BROOKLYN, N. Y. *







Foundry Activities

Reflect Industrial Trends

GRIFFIN WHEEL CO., 445 North Sacramento boulevard, Chicago, has erected a new building to house its molding floor, the old structure being razed. Molding machines have been purchased to provide an output of 450 wheel molds daily.

* * *

Plano Foundry Co., Plano, Ill, recently was damaged slightly by fire.

* * *

Wabi Iron Works, New Liskeard, Ont., plans a 1-story foundry 60 x 76 feet and 32 x 57 feet.

* * *

Excello Die Casting Co., Grand Rapids, Mich., has been organized by Edward J. Hultman, 1140 Monroe avenue, northwest.

* * *

Keen Foundry Co., Hammond, Ind., is being reorganized. Louis E. Keen, 47 Waltham street, Hammond, is resident agent.

* * *

American Magnesium Corp. is building a foundry at 2210 Harvard avenue, Cleveland. The plant is 85 x 100 feet.

* * *

Crompton & Knowles Loom Works, Grand street, Worcester, Mass., plans extensions and improvements to its power house.

* * *

Somerville Iron Works, Somerville, N. J., has received a loan of $400,000 from RFC, which will be utilized to resume full production at its branch plant in Chattanooga.

* * *

Index of foundry equipment orders for September was 46.40 as compared with 43.1 in August and 34.9 in September, 1933, according to a report of the Foundry Equipment Manufacturers association, Cleveland. Further reports from that association show that the dollar volume of sales for the first nine months of 1934 has exceeded the total volume for both 1933 and 1932 and just equaled the volume for first nine months of 1931.

* * *

State of Minnesota plans the construction of a 1-story foundry addition at its state prison at Stillwater, Minn. The plant will be 28 x 180 feet and will cost $40,000.

* * *

Lakey Foundry & Machine Co., Muskegon, Mich., recently increased operations and reports a greater volume of business in sight for the next 6 months than for any time since 1928. Herman L. Becker is president and general manager.

* * *

Stainless Steel Castings Co. of America Inc., 802 West Wisconsin National Bank building, Milwaukee, has been organized by Leo G. Smith. Location of the plant will be announced in the near future.

* * *

Enterprise Brass Works, Muskegon, Mich., recently started to manufacture a new automatic humidifier for warm air furnaces for the Turney Corp., a new concern recently organized in Muncie, Ind.

* * *

General Foundries Co., 1555 South Barclay street, Milwaukee, has been operating at capacity since February according to D. A. Lucas, general manager. The firm has developed a hot water heater which will be placed in production around Dec. 1.

* * *

Stove foundries in the St. Louis district have been operating at a high rate in recent weeks, the season extending longer than usually is the case. Backlogs and new orders indicate no slowing down in the near future.

* * *

Standard Gray Iron Foundry Co., with offices in the General Motors building, Detroit, has leased the foundry equipment and building of Morris Birnbaum, Wyandotte, Mich., and will conduct a general business in gray iron castings.

* * *

Production of gray iron and steel castings declined during September, according to reports received from the Industrial Research department of the University of Pennsylvania on foundries operating in the Philadelphia Federal Reserve district. In

RAW MATERIAL PRICES
Nov. 8, 1934

Iron	
No. 2 foundry, Valley	$18.50
No. 2 Southern, Birmingham	14.50
No. 2 foundry, Chicago	18.50
No. 2 foundry, Buffalo	18.50
Basic, Buffalo	17.50
Basic, Valley	18.00
Malleable, Chicago	18.50
Malleable, Buffalo	19.00
Charcoal iron, furnace	21.00
Coke	
Connellsville beehive premium	$ 5.10 to $ 5.35
Wise county beehive coke	4.30 to 5.30
Detroit by-product coke	8.50
Scrap	
Heavy melting steel, Valley	$10.50
Heavy melting steel, Pitts	10.75 to 11.25
Heavy melting steel, Chicago	8.50 to 9.00
Stove plate, Buffalo	8.50 to 9.00
Stove plate, Chicago	5.50 to 6.00
No. 1 cast, New York	6.25 to 6.50
No. 1 cast, Chicago	8.50 to 9.00
No. 1 cast, Pittsburgh	12.00 to 12.50
No. 1 cast, Philadelphia	11.00
No. 1 cast, Birmingham	8.50 to 9.00
Car wheels, iron, Pittsburgh	10.00 to 10.50
Car wheels, iron, Chicago	9.50 to 10.00
Railroad malleable, Chicago	9.00 to 9.50
Malleable, Buffalo	10.50 to 11.00
Nonferrous Metals	**Cents per pound**
Casting copper, refinery	7.37½
Straits tin	51.37½
Aluminum, No. 12, producers	18.00 to 20.00
Aluminum, No. 12 (Standard)	15.00
Lead, New York	3.60
Antimony, New York	11.75 to 12.00
Nickel, electro	35.00
Zinc, East St. Louis, Ill.	3.75

spite of the decreases in tonnage, steel castings produced was 77.0 per cent more than in September, 1933, and the volume of gray iron castings was 12.9 per cent more than a year ago. Production of malleable iron castings increased during September.

* * *

Pontiac Mfg. Co. has been organized for production of replacement parts for automobiles. The company has taken over the plant on Scott Lake road, which also includes a foundry and a machine shop. Hugh Chalmers Jr. is the president.

* * *

Bohn Aluminum & Brass Corp., 2512 East Grand boulevard, Detroit, has planned for a $15,000,000 to $20,000,000 expansion program in Detroit as the result of a discovery of a new process for the manufacture of aluminum.

New Trade Publications

DIAMOND WHEELS—Norton Co., Worcester, Mass., has published an attractive folder on its bortz (diamond) wheels for grinding and lapping cemented carbides. The text presents the story of that type of wheel, and the operations for which it may be used to greatest advantage. The diagrams show the available shapes and sizes.

TEST PLIERS—Star Fuse Co. Inc., 235 Canal street, New York, has published a bulletin describing its test pliers which may be used to give an indication if there is electric current in a line.

TRAMRAIL SWITCHES — The Cleveland Crane & Engineering Co., Wickliffe, O., has published a folder illustrating a number of uses of its tramrail switches. Construction details also are shown.

GRINDERS — Standard Electrical Tool Co., 1938-46 West Eighth street, Cincinnati, has published a catalog dealing with electric grinders, bumpers and drills. Grinders include a wide variety of portable, bench and stand types.

GRINDING—Carborundum Co., Niagara Falls, N. Y., has published a treatise on the grinding of cemented carbides. The data includes a discussion of the grinding problem, information on factors affecting grinding wheel action, data on the diamond wheel produced by that company and a general discussion of the methods of grinding that type of work.

PUMPS—Worthington Pump & Machinery Corp., Harrison, N. Y., has published a bulletin on its horizontal duplex piston pumps for general services. A diagram shows the construction and the text deals with sizes and capacities as well as specifications.

CORE OIL—Certified Core Oil & Mfg. Co., 1104 South Cicero avenue, Chicago, has published a booklet containing information regarding various grades of core oils produced by that company and also recommendations on proper uses.

PRESSURE REGULATORS — Air Reduction Sales Co., 60 East Forty-second street, New York, has published a booklet on oxyacetylene welding and cutting pressure regulators and regulation problems. The data includes an extensive discussion of the matter of operating the regulators.

PYROMETERS — Russell Electric Co., 340 Huron street, Chicago, has published a folder on its line of pyrometers for industrial use including coremaking, heat treating, die casting, annealing, etc. Information includes the features of design especially applicable to certain installations.

ABRASIVE WHEELS — Bakelite Corp., New York, has issued a 24 page booklet giving information on grinding wheels bounded with synthetic resin which it manufactures. Included in the text are data on what the wheels are and what they do, synthetic resin bond, how grinding wheels work, and uses of that type of wheel.

SPEED REDUCERS—Falk Corp., Milwaukee, has published a catalog on its various types of motoreducers. The text presents features of design which make the various types particularly fitted for certain applications and information is presented covering dimensions and reduction ratios.

OVEN HEATER—Willsea Works, 1042 University avenue, Rochester, N. Y., has published a folder describing the economies of its controlled heater with thermo syphon heat convection for automatically controlled foundry ovens. Construction of the heater, which may be used for core or mold ovens, is described and the method of controlling the heat is discussed.

PATENTS—An outline of the law and practice relating to the rights of employers in the inventions of employes has been prepared in booklet form by Charles F. Murray, Monadnock block, Chicago. The subject has been condensed from extensive data collected through years of research and practice of the related law. The text is so prepared as to be easily understood by the layman.

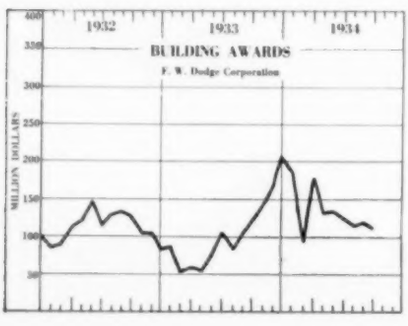
VIBRATING SCREENS—Link-Belt Co., 910 South Michigan avenue, Chicago, has published a catalog on its line of vibrating screens. Unbalanced-pulley as well as positive drive types of screens are covered, including a positive drive screen for operation at a flat angle, making it suitable for use in places where the headroom is limited. Several types of dust enclosures are included, with dimensions for laying out an installation.

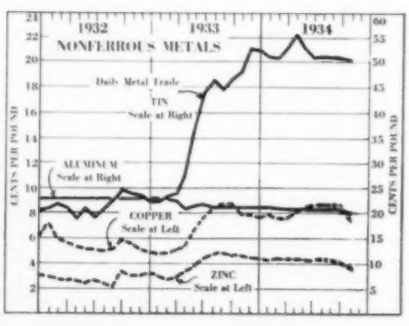
RESEARCH—An attractive booklet recently has been prepared by the Battelle Memorial institute, Columbus, O., illustrating and describing the work of that organization in relation to industry. Reproductions of photographs show the institute building as well as the industrial laboratory, the foundry, the physics and metallographic laboratories, the chemical laboratory, and numerous other departments of the organization.

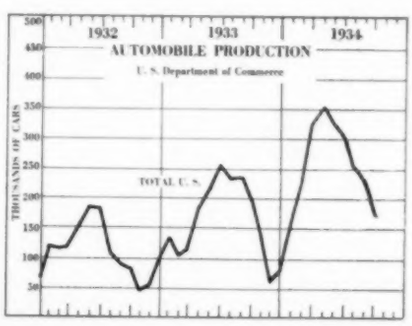
ALLOY CASTINGS — Michiana Products Corp., Michigan City, Ind., has published an attractively illustrated booklet on its line of heat and corrosion resistant alloy castings. The text includes a general classification of materials produced. The photographs show castings for food machinery and corrosion resistant parts, canning machinery parts, trays, retort furniture and annealing boxes, and retorts for metallurgical and chemical operations.

Faked Foundry Facts

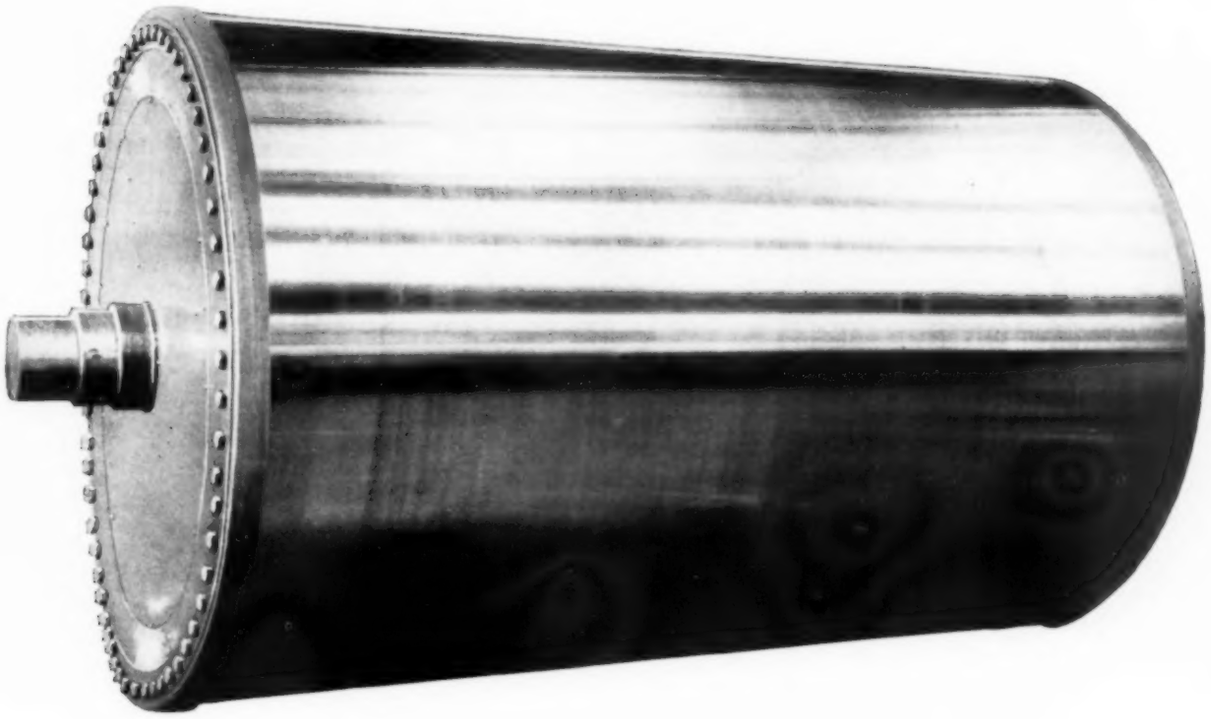
Jarring Machine







400 FEET OF FLAWLESS SURFACE



MADE WITH Silvery Mayari

A 10-ft.-diameter dryer roll—of heavy wall thickness, and its diameter twice that of the dryer rolls commonly used in American plants—was ordered recently from the Pusey and Jones Corporation, Wilmington, Delaware. A requirement was that this roll had to be flawless, without a pin-point pore in its more than 400 square feet of surface. Naturally it presented unusual problems. To obtain the best possible casting, the foundry turned to Silvery Mayari.

When the casting came from the mold, it was perfect. The roll was uniformly sound throughout. It machined readily to a mirror-like finish. And it had been produced at a lower cost than would have been possible by any other method. The heads and hollow shafts were also made with Silvery Mayari in the mixture.

Silvery Mayari opens the way to the production of fine-grained, easy-machining, high-test castings from mixtures containing as much as 80 per cent of steel scrap—and does it without complicated cupola practice and without the addition of expensive alloys at ladle or spout.

We suggest that interested foundrymen communicate with Bethlehem foundry specialists about the use of Silvery Mayari for better, more economical high-test castings for every purpose.

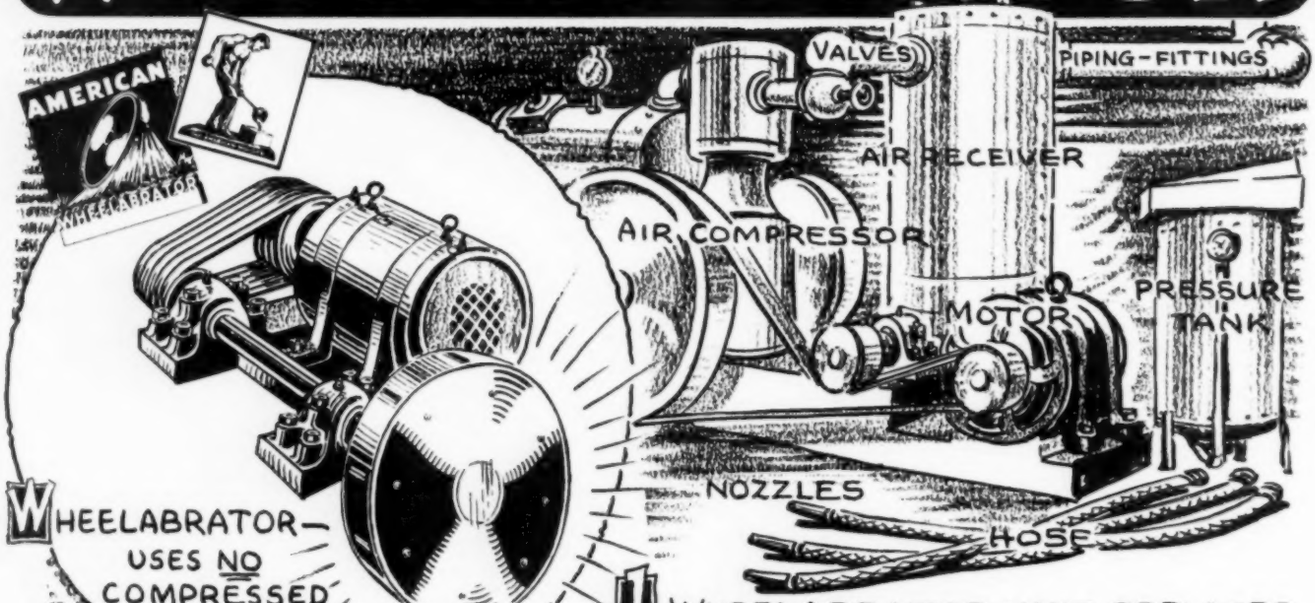
Bethlehem Steel

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

District Offices: Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Indianapolis, Kansas City, Milwaukee, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul, Washington, Wilkes-Barre, York. *Pacific Coast Distributor:* Pacific Coast Steel Corporation, San Francisco, Seattle, Los Angeles, Portland and Honolulu. *Export Distributor:* Bethlehem Steel Export Corporation, New York.

BETHLEHEM STEEL

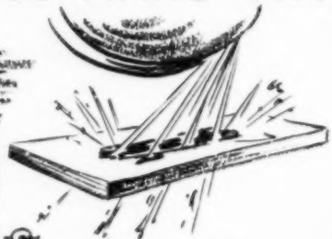
AMAZING FACTS ABOUT WHEELABRATOR



WHEELABRATOR—USES NO COMPRESSED AIR!

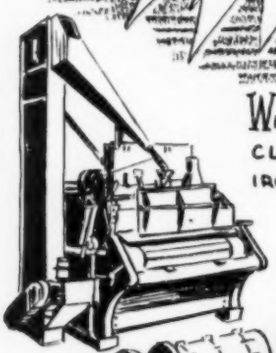
1 WHEELABRATOR UNIT REPLACES, AIR COMPRESSOR-100 H.P. MOTOR-AIR RECEIVER-PRESSURE TANK-NOZZLES-HOSE-PIPING-FITTINGS-ETC—

ONE WHEELABRATOR WITH 10 H.P. MOTOR IS MORE EFFECTIVE THAN 3-BLAST NOZZLES WITH 90# PRESSURE USING 100 TO 150 H.P.

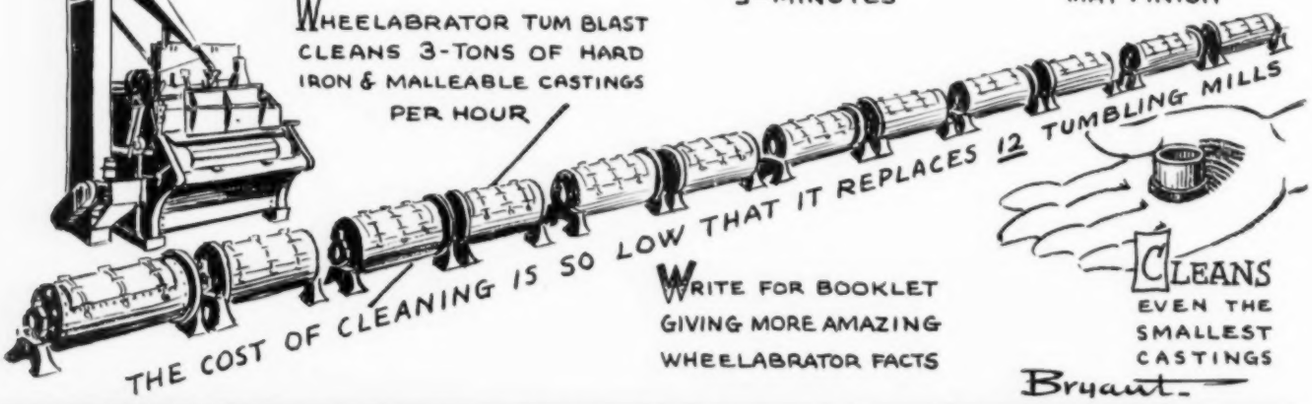


SO POWERFUL THAT IT CAN CUT THROUGH 1/8" STEEL PLATE IN 5-MINUTES

SO DELICATELY CONTROLLED 36-GAUGE STEEL IS GIVEN A FINE MAT FINISH



WHEELABRATOR TUM BLAST CLEANS 3-TONS OF HARD IRON & MALLEABLE CASTINGS PER HOUR



THE COST OF CLEANING IS SO LOW THAT IT REPLACES 12 TUMBLING MILLS

CLEANS EVEN THE SMALLEST CASTINGS

WRITE FOR BOOKLET GIVING MORE AMAZING WHEELABRATOR FACTS

Bryant

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